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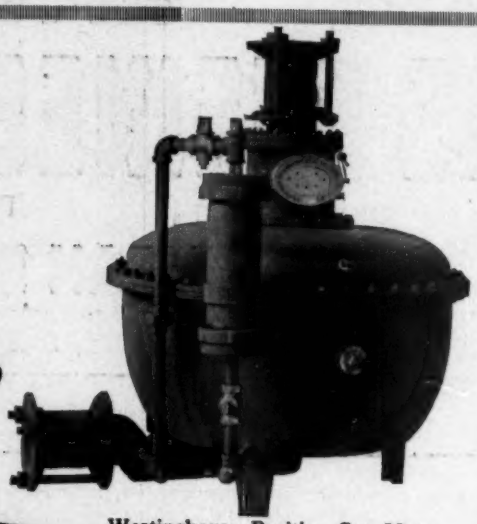
Disposal of Condensation,— The Gas Man's Greatest Problem, Solved.



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113 Miles of Pipe Line Completed in Record Time Despite Adverse Conditions

Over High, Rocky Bluffs and Across Rivers the Lines are Carried Through, Though Weather Conditions Set New Record — Ten Tons of Dynamite Used in Rocky Stretches — Trenching Machine Cuts 26 x 44 In. Trench at Rate of Mile a Day

By R. E. MORRISON, Kansas City, Mo.

High rocky bluffs, wide sandy river bottoms, other streams as deep, comparatively, as the first were wide, peculiarly complex railroad crossings, and, later, the havoc of heavy snow and low temperatures that set new mid-continent weather records—all those things were no barrier to the gas organization of the Empire companies, which built 113 miles of new pipe lines from September to the latter part of January, when gas was turned into the 43 miles of 16-in. line tapping the Blackwell, Okla., field. The Empire companies are the Henry L. Doherty gas and oil interests in the mid-continent field.

3,000 Miles of Pipe Lines in System

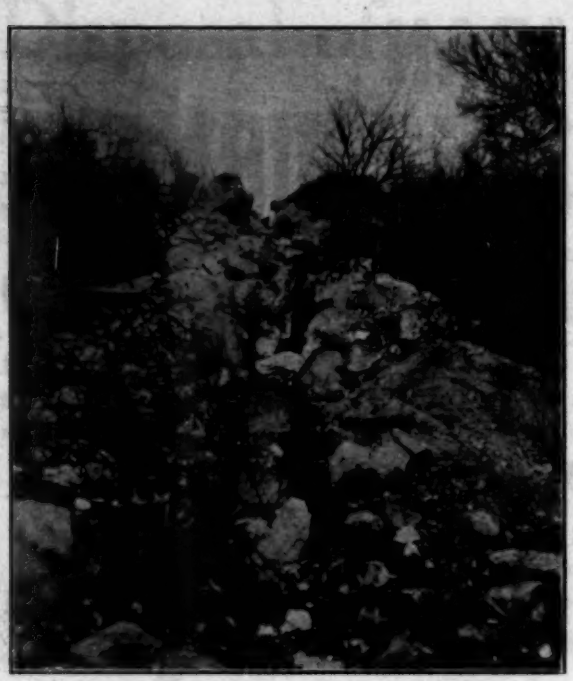
Nearly all of the various lines included in the total of 113 miles were in the nature of emergency measures—planned to bring better supplies in towns in Missouri, Kansas and northern Oklahoma on the system's 3,000 miles of supply pipe line. Not only did the emergency, with its demand for speed, feature the effort, but nearly all of the work was done under harrowing conditions of one sort or another. The improvements represent an expenditure of $2,500,000.

The improvements were made under the immediate direction of Frank P. Fisher, assistant general manager in charge of all gas interests of the Empire companies. Ross M. Stuntz, superintendent of gas pipe lines, was the man on the construction "firing line," and the one generally credited for pushing the work to completion in quick time.

Crossing the Arkansas River

The first of the main trunk lines of the extension program, that reaching out to the Osage-Hominy field, was completed in November. It is a 12-in. line, and is welded the greater part of its length. It is in the heart of the Osage nation, famed for its all but impenetrable hills of flint rock. Those were the complicating features of the Hominy line, but the construction

12-IN. LINE ACROSS "ROBBER'S BLUFF"



DRILLING GANG PAVING THE WAY FOR 16-IN. LINE

gangs worked in favorable weather and the conquest of the wild Osage country was effected in record time.

The Blackwell line, however, centers attention in any consideration of the improvements, chiefly for the extremes that were reached in difficult line construction. The pipe liners ripped their way with dynamite more than half of its length, and when the rocky stretches were left behind and rolling farm lands lay in their path, they were plunged by the weather into a contest with mud and caving ditch.

Cutting Through the Rock Bluffs

The line crosses the Arkansas River at Arkansas City. Between there and Cambridge, Kan., compressor station are miles of hills, lying close together for the most part and consisting chiefly of cotton rock. Some of those the line was made to climb are so steep a man cannot scramble up their sides. Others are roughly rolling, but the rock is almost uniformly present. In the case of the latter earth was plowed up to a depth varying from an inch or two to more than a foot before the underlying rock was encountered.

The sheer rock bluffs and the underlying formations were attacked by twelve pneumatic drills, each a unit consisting of drill, tank, compressor and 5-horsepower gasoline engine, mounted on a running gear. Four-foot holes were drilled for most of the blasts.

Trenching Machine Travels a Mile a Day

The blasting gang used more than 10 tons of dynamite to open the ditch. Two tons were required for the conquest of Silver Creek bluff alone. That is 3 miles southwest of Burden. The drilling and blasting gangs worked there a month and shot away a ditch 30 ft. deep, measuring at an angle down and back from the brow of the bluff.

South of the Arkansas River the country is more level and the soil deep. A ditching machine was employed there which ate its way along at the rate of a mile each twenty-four hours, cutting a ditch 26 in. wide and 44 deep. It weighs 19 tons, and is driven by a 40-horsepower gasoline engine. Eight men form its crew. In addition to its speed and economy of labor, it leaves the ditch in perfect readiness for pipe laying. The buckets of the heavy wheel that revolves and does the cutting are so shaped they make the bottom of the ditch round, conforming to the cross-section of a piece of pipe.

Because the parts of the ditch dug by the machine promised means of a speedy finish of the work, and because some unfavorable weather was anticipated in the early winter, those parts of the line were left for the final pipe laying. But the unfavorable weather was more severe than the pipe liners could well have guessed. Twice there were blizzards that filled open ditches level full with snow. The snow melted subsequent to the first storm before it could be shoveled away, and caused caving and much mud.

Pipe Scarcity

Except for considerable welding on some of the more difficult hillsides and in the Walnut River crossing, the line is a coupled one. The crossing of the Arkansas River is an exception. There the line was divided into 10-in. lines so that a break will always leave means in reserve to carry gas across the river. Those lines are laid with screw joints, protected by rubber pack joints, which in turn are encased in ½-ton river clamps. The lines are bowed against the current to afford greater resistance.

Scarcity of pipe last summer threatened to block an immediate start on the program of extension adopted by the Empire companies. It was arranged, however, to reclaim the 16-in. pipe necessary for the Blackwell line, as well as material for other new lines now under construction. Work of reclamation promised to be no quick and easy job in itself until H. O. Ballard, former superintendent of gas lines for the organization, and now its superintendent of oil production, went to the rescue with the invention of a lifting machine.

"Uncover the pipe," said Mr. Ballard. "I'll get it out of the ditch mighty fast."

Reclaiming Old 16-In. Line

And he did. His lifting machine wasn't much for looks, but it did the work. A heavy cross-arm extends across the ditch from a swedge mounted on a wagon. The far end has a support similar to that at one end of a "horse." Next to the swedge sits a winch with friction clutch, driven by a 4-horsepower gasoline engine. A cable runs over a system of blocks from the winch to two grappling hooks that fit the bolts of a pipe coupling. When power is applied to the winch it lifts the pipe clear of the ditch, skids are slipped under it and the wagon and team go on to the second coupling ahead. Two joints are lifted at one time.

Fifteen hundred men were employed at one time on the new line. So hard was it to get men that the company sent employment agents to many cities, including

San Francisco, Galveston, Chicago and Cincinnati. The wages paid were abnormally high.

During the progress of the improvements the purchase of the American Pipeline Company by Henry L. Doherty's holding company, Cities Service Company, was announced. Four of the 113 miles of new lines were laid near Caney, Kan., to join the new property to the Empire system. The American purchase included 288 square miles of gas territory under lease, 50 miles of new pipe line, chiefly 12-in., a modern compressor station and a private telephone system.

Indiana Ruling Points Out Need of More Elastic Rate Structure

Adopts London Sliding Scale Principle in Electric Company Ruling—The Incentive to Economy

In an order issued by the Public Service Commission of Indiana in the case of the Hydro-Electric Company, of Connersville, Ind., the London sliding scale principle is applied. While the specific case pertains to an electric company, the advancement of the new theory of rate control of utilities in Indiana may mark a distinct step in rate-control problems of gas utilities throughout Indiana.

The Connersville company is without bond issues, and in other ways suitable for the experiment.

The parts of the order, in which the "mutuality of interests" theory, as between the utility and its customers is set out, follow:

Need of More Elastic Rate Structure

In creating a rate structure at this time the commission is confronted with abnormal costs of operation. These abnormal costs are generally attributable to war, and are generally thought to be temporary. No one, however, can even prophesy whether the abnormally high prices shall long continue, whether they shall advance to a still higher point, or whether, with an early end of war, there will be a return to normal operating cost. Even a subnormal price era of coal, labor and materials may not be far distant. Neither is it possible for any commission to foresee what will be the financial obligations laid by the Government on petitioner in the form of taxes on corporations, and there are many other uncertainties, creating a condition which makes the future absolutely uncertain.

The times are not only most opportune for, but almost demand the introduction of a less arbitrary and a far more elastic rate structure than it has been the policy of American regulatory bodies to construct. The time is ripe for adopting self-adjusting devices that automatically will meet changing conditions, and that, with justice, will levy penalties and benefits alike on both the public utility and the public served. Such an accomplishment will be sought in this order. The application of unusual methods is invited, also, by the statement of the counsel for petitioner, who, in the hearing, expressed the desire that a rate be determined "that shall be satisfactory not only to the utility on the one hand, but to the consumers on the other."

If it is possible to create a common interest between the public utility and communities served, on the basis of reducing rates to consumers and increasing the rate of earning for the utility, a far better condition will be created than now exists. Under present conditions the community being served has nothing in common, in interest, with the public utilities serving it, and generally there is decided hostility between the two, which leads to radical propaganda both on the part of patrons and public utility companies.

Under such conditions there has been built up a system which offers very little incentive to public utilities to work for higher efficiency. If the public utility operator is going to create antagonism by bringing about radical economies which will increase the utility company's rate of return, then it follows in human nature that the public utility operator is not going to be inspired to create these radical changes.

If, on the other hand, a community has a primary net rate of 9 cents per kilowatt-hour, and the public utility is permitted to earn 6½ per cent on its valuation, will not an incentive to reduce rates be created by offering to that public utility for every 10 per cent reduction made in rates a one-half of 1 per cent increase in its earning power.

On the other hand, if the public utility is to be penalized one-half of 1 per cent earning for each 10 per cent increase in its rates to consumers, is not the public utility going to be inspired to make the most extreme effort to maintain the lower rate, and thus maintain the higher earning on valuation?

Has Been Tested Out

Such a rate structure is not visionary. The proposal is not original. It is true that, applied in this instance, it is possibly the first application of the principle to an electric utility in this country, and the result will necessarily be that its application will attract national attention. The theory has long been applied in Great Britain. Most of the privately owned public utilities there, in England and Scotland at least, operate under automatic adjusting rate and earning arrangements, built on the theory that is here outlined, and it has been employed in one or two notable instances in simpler services than electric service in this country.

Such an elastic rate structure is best suited to those simpler public utilities, such as gas and water, but with proper supervision and inspection to ascertain that the plant is not starved, or the standards of service lessened, in order to reduce the rates and thereby increase the earning power, and to insure also that benefits are shared with the public served, it can be safely applied in such an electrical operation as is here considered.

Without such proper supervision and inspection of plants and services placed under such operation, the gate would be opened wide for a new kind of exploitation and wrecking of public utilities. This danger is fully appreciated, but if the State safeguards the upkeep of the plant, such exploitation can be prevented. Under the operation of such a rate structure system the State does not relinquish its control. The State, by audits and checks, must see that benefits due the public are distributed. Such a system, providing with certainty a sustaining rate of earning, does not contemplate accumulations of large surplus, aside from the funds to cover depreciation.

There is not only in this case the provocation for establishing a rate and earning structure that will be elastic enough to meet abnormal or subnormal conditions that may be just beyond the curtain of the present,

but there exist two other provocations for creating a steady and heavy pressure on the company's incentive.

Return Allowed on Excess Capacity

First, this utility company is now operating in a field of 15,000 to 17,000 population, with a plant of 1,200 kilowatts generating capacity. It is now increasing its generating plant capacity by 1,000 kilowatts. The cost of this increased capacity is being included in the valuation for rate-making purposes. The community is here called on to pay a sustaining rate on a plant large enough, probably, to serve a normal community of 25,000 people. The enlargement of such a plant to such a point is probably justified by the expectation of increased demand, and also by the desirability of reserve equipment which, in case of accident, shall be available for maintenance of service. It is justified to such an extent that no deductions for surplus plant are made in the valuation for rate-making purposes.

The company, nevertheless, is the holder of this added generating capacity for which the people and the industries and business of the community are being called on to pay rates which will return a revenue on investment. There should be something to inspire this trustee of such property to increase the volume of its business, to put that excess plant equipment into operation, and thus relieve those who will now be called on temporarily to carry this excess plant. If this company can do even one-half more business with the new plant, then it should share the added earning with the public in the form of lower rates.

Second, this utility has available of acquirement an estimated 800 hp. of hydro energy, and in a wholly new era in which coal may take on new values conditions should be created which will press on this public utility the development of all the potential possibilities of its water-power rights in reducing costs of the generation of electric energy.

These are at least two of the desirable ends to be attained by the extra incentive developed in the public service company. Such a rate structure system should, however, create a community incentive that should function with the incentive created in the company. There is present in Connersville very strongly the need of making the whole community, from its residential to industrial sections, sympathetically and closely interested in the upbuilding and the welfare of a very high character of central electrical power station.

Connersville is developing into a great industrial center, and the greatest boon to such aspirations now is to be found in thoroughly modern central power stations which will furnish industrial motive power at low cost.

On the one hand, regulatory bodies to-day face uncertainties as to the cost of materials and money, and other conditions entering into public utility operation. On the other hand, they face the absolute certainty that the day of the individual power house and steam motive power is certainly disappearing.

No city or community can now look to the future with aspirations for great industrial development without having as its foundation for industrial growth a thoroughly modern power-generating plant which will provide electric motive power at rates that will make that community competitive with others in low costs of operation.

It can safely be held that such a plant is a greater boon to such a community—and far more permanent—than natural gas wells and coal mines, and the creation of such a foundation for a modern industrial center is far more vital to-day than is a policy of giving subsidies for location of industries that are of doubtful value or permanency. It must be recognized also that an electric public utility in a community such as Connersville, which is industrial and has industrial possibilities, is passing rather beyond the strict classification of a utility primarily built to afford what was originally conceived to be electric lighting and power service. It is developing now into a great industrial factor. In this development, however, the public—differentiated from the industries which come now on to such central stations for their power—must be protected in just distribution of rates.

Question of Proper Basis

In adopting a more elastic rate structure policy, as herein outlined, the great question is what are the proper basis. In normal times the Public Service Commission of Indiana has adopted 7 per cent as a fair return on the basis of valuation. On electrical properties it has adopted 3 per cent as a fair basis for depreciation.

There is no reason why the 3 per cent depreciation should be changed.

On the other hand, the question of return on valuation is open to considerable controversy, and is influenced by present high operating cost conditions. The Public Service Commission of Indiana, in ruling on emergency appeals of public utilities for relief, has set down what it considers to be, and what it will consider to be in this case, a fair foundation for relations between public utilities and the public in war times. The commission does not propose, in these days of heavy burdens, to shift from public utilities to their patrons, most of whom cannot pass the burden along, all the cost of war. It refuses to underwrite usual dividends, and will do so in this instance, but it will offer to this company a possible increased percentage of earning measured by its own success in creating economies and increasing of volume of business, and will also create a condition which will practically guarantee to this company a safe sustaining rate of return under any conditions that are likely to arise.

Fair Rate of Return Under Existing Conditions

What is a fair rate of return on investment under these conditions? If the cost of operation were normal, the commission would, in this instance, be willing to grant a rate of 7 per cent return on valuation, for under normal costs of operation the rates charged for electric energy would be less than those that can be put into effect at this time. The basis here taken will be a return of 6½ per cent on the ascertained valuation.

For every 10 per cent reduction in rates, taken as a whole, the said 10 per cent to be applied alike on lighting and power schedules in the city of Connersville and East Connersville, and adjacent territory hereinbefore stipulated as included in this rate order, petitioner may increase the rate of earnings on the ascertained valuation one-half of 1 per cent, and for each subsequent 10 per cent reduction in rates, similarly applied, petitioner may increase the earning return on valuation one-half of 1 per cent.

If petitioner, encountering even higher costs of operation, finds it necessary to increase rates above the rates hereinafter provided, it shall have authority to do so, on proper showing, but for each 10 per cent increase in rates there shall be a one-half of 1 per cent reduction in the rate of return on valuation.

The commission will also consider 5 per cent reductions or increases of rates, attended by one-fourth of 1 per cent increases or reduction in earning power, if such application is made.

In creating the primary rate structure hereinbefore set out, the commission, for reasons stated, has given latitude for readjustment which, if petitioners' expectations of business and possibilities in economies are realized, should soon result in a reduction of the rates for service and an increase of earning power. While the commission places 6½ per cent return as the basis for return, it does not place the usual implied limitation of 7 per cent on earnings. Three 10 per cent reductions in rates will raise the earning power to 8 per cent, four to 8½ per cent, and a fifth reduction to 9 per cent. Two or three reductions of 10 per cent will give Connersville one of the lowest electric light and power schedules in the State and give the public utility a financial standing that will be the envy of other such corporations in the State. Such results should certainly be realized with the return to normal costs of materials, etc., entering into cost of production after the war.

Physical Property and Safeguarded Earning Power Are Assured the Utility Investor

The only manner in which gas and electric companies can render service is by creating large producing and distributing systems.

This means that they must have tangible, physical property—power plants, gas works, pipe lines, conduits, pole lines, transformers, meters—in brief, costly plants, anchored to and built in the soil.

Public utility systems cannot be picked up and moved away. They can't be devoted to any other purposes—speculative or otherwise—than those for which they were intended.

These industries are semi-public enterprises, and as such are entitled to earn a fair rate of return upon the investment, as determined by the courts, legislative bodies and public utility commissions, without exception.

The investor thus has two great fundamentals of sound investment presented in the securities of gas and electric companies—namely, physical property and safeguarded earning power.—*Excerpt from "The Straight Road to Financial Success," by William H. Hodge.*

The Honest Salesman

Some salesmen would sell grafanolas to deaf men to improve their education; they would sell "Views Around the World" in ten colors to folks in a home for blind. With such salesmen the sale is the all-important thing, so long as they have a goodly total of sales for the month. The question of whether the buyers have gained anything is of small import. That's not salesmanship. A good and simple rule is—be honest with yourself.

Determining the Most Satisfactory Formula for Measuring the Flow of Natural Gas Through Pipe Lines

Can be Used as Continuous Check on Meter Readings—Variations of Formula in Use—Weymouth Formula Found the Most Reliable

By E. O. HICKSTEIN
Bartlesville, Okla.

This paper deals with formulas for calculating the flow of natural gas through pipe lines of all sizes. It discusses the three formulas that are in general use, shows the variation among these, selects the one which appears the most reliable, and expresses this one in what the writer has found to be the most convenient form.

Of the three formulas used, the oldest is from F. H. Oliphant.* This formula is frequently used because it is given in two handbooks of rather wide circulation among oil and gas men.**

For natural gas, of gravity 0.6 (air equals 1.0), Oliphant's formula reads:

$$Q = 42\,a\sqrt{\frac{P_1^2 - P_2^2}{L}} \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where Q = flow of gas, in cubic feet per hour.
a = a constant, equal to the 2.542nd power of the *nominal* pipe diameter in inches.
P_1 = pressure, in pounds absolute, inlet to line.
P_2 = pressure, in pounds absolute, outlet of line.
L = length of line, in miles.

The second formula, first used by H. R. Davis, has never been published, but was used as the basis of a circular calculator for pipe-line flow designed by Mr. Davis.

This reads:

$$Q = 50\,d^{2.5}\sqrt{\frac{P_1^2 - P_2^2}{L}} \quad . \quad . \quad . \quad . \quad . \quad (2)$$

where d = actual inside diameter of pipe in inches, the other symbols retaining their meaning as above.

The exponent, 2.5, in this formula, was worked out theoretically; the coefficient, 50, was determined experimentally for one size of pipe, 8 in., and the formula was then considered approximately correct for sizes slightly under and over 8 in., *i. e.*, 4 in. up to 12 in. The formula was easy to remember, not hard to work out, and gave reasonably satisfactory results.

The third formula is from T. R. Weymouth.*** In its original form, this reads:

$$Q = 18.062\,\frac{T_b}{P_b}\left[\frac{(P_1^2 - P_2^2)\,d^{5\,1/3}}{G\,T\,L}\right]^{1/2} \quad . \quad . \quad . \quad (3a)$$

where G = gravity of the gas.
T_b and P_b = absolute temperature in degrees Fahr. and absolute pressure in pounds, at which the volume of the gas is expressed (temperature and pressure base, so-called).

* "Production of Natural Gas in 1900," U. S. Geological Survey.
** "Handbook of Natural Gas" and "Handbook of Casing-Head Gas," both by H. P. Westcott, published by Metric Metal Works, Erie, Penna.
*** "Problems in Natural Gas Engineering," Paper read before the Am. Society of Mech. Engineers, Spring Meeting, 1912.

T = temperature of the flowing gas in degrees Fahr. absolute.

Q, P_1, P_2, L and d as before.

To change formula (3a) to the same form as (1) and (2), let T = 520, P_b = 14.4, T_b = 520, and G = 0.6; then,

$$Q = \frac{18.062 \times 520}{14.4 \times \sqrt{520} \times \sqrt{0.6}} d^{8/3} \sqrt{\frac{P_1^2 - P_2^2}{L}}$$

or

$$36.91\, d^{8/3} \sqrt{\frac{P_1^2 - P_2^2}{L}} \quad . \quad . \quad . \quad . \quad . \quad (3)$$

Based on formulas (1), (2) and (3), the following values are the coefficients for the term $\sqrt{\frac{P_1^2 - P_2^2}{L}}$ for different sizes of pipe.

Size of Pipe (Inches)		Coefficient for the Term $\frac{P_1^2 - P_2^2}{L}$		
Nominal	Int. Diam.	Oliphant	Davis	Weymouth
2	2.06	248.7	304.1	253.1
3	3.06	693.4	820.0	734.0
4	4.03	1432.0	1635.0	1532.0
5	5.04	2520.0	2859.0	2763.0
6	6.10	3991.0	4608.0	4600.0
8	8.10	8320.0	9340.0	9660.0
10	10.19	14,700.0	16,600.0	17,660.0
12 O. D.	11.43	20,590.0	22,085.0	24,320.0
12 I. D.	12.25	23,360.0	26,265.0	29,310.0
16	15.375	43,050.0	46,350.0	54,200.0
18	17.375	59,240.0	63,400.0	87,030.0

It will be noticed from this table that there is a fair agreement between the Oliphant and Weymouth coefficients only for the very small sized pipes. For 18-in. pipe, the variation is nearly 50 per cent of the Oliphant coefficient. The Davis and Weymouth coefficients agree only between about 5-in. and 10-in. pipe sizes, as would be expected from the method by which the Davis formula was derived. The Oliphant and Davis coefficients do not agree closely for any size.

Some four years ago, the writer selected the Weymouth formula as being the most reliable, and since then has calculated many hundreds of checks for this formula. The tests were on all sizes of lines from 2-in. to 18-in., on pressures ranging from a large vacuum to over 300 lb., and were made either against meter readings or against compressor cylinder displacement. The result has been a convincing demonstration of the accuracy of the Weymouth formula. This result is quite in accord with the experience of most engineers who have given this question any study.

The writer will now give a few constants and a table which he has found very convenient in his calculations. These are all based on Mr. Weymouth's original formula (3a in this paper), with the substitution of arbitrary constants for some of the variables.

The most convenient unit of quantity has been found to be a twenty-four-hour flow of 1,000 ft. of gas at 60 deg. temperature base, and 14.4-lb. pressure base (this corresponds with "free gas" at the average barometer reading over the entire natural gas country).

This reduces (3a) to

$$Q_{\left(\frac{\text{M. cu. ft.}}{\text{24 hrs.}}\right)} \frac{24 \times 18.062 \times 520}{14.4 \times 1{,}000} d^{8/3} \sqrt{\frac{P_1^2 - P_2^2}{L}}$$

or

$$K_1 \frac{\sqrt{P_1^2 - P_2^2}}{\sqrt{G\,T\,L}} \quad . \quad . \quad . \quad . \quad . \quad (4)$$

In formula (4), K_1 is a combination of all the constants shown. Using values for Q, T_b and P_b, as stated, the values of K_1 are:

2 in.	107.5	10 in.	7,493.0
3 in.	311.3	12 in. O. D.	10,322.0
4 in.	649.5	12 in. I. D.	12,434.0
5 in.	1,168.0	16 in.	22,997.0
6 in.	1,948.0	18 in.	36,924.0
8 in.	4,099.0		

A further simplification of (4) is possible by assigning values to G, the gravity, and to T, the temperature, of the flowing gas. This reduces the formula to

$$Q = K_2 \frac{\sqrt{P_1^2 - P_2^2}}{\sqrt{L}} \quad . \quad . \quad . \quad . \quad . \quad (5)$$

where K_2 is a new constant, equal to $\frac{K_1}{\sqrt{G\,T}}$

If we assume T equal to 520 deg. absolute, and give G values from 0.60 to 0.70, the range encountered in practice, the values of K_2 are as shown.

Size of Line (Inches)	Values of K for Values of Gravity as Indicated					
	0.60	0.62	0.64	0.66	0.68	0.70
2	6.08	5.98	5.89	5.81	5.72	5.64
3	17.62	17.35	17.06	16.82	16.56	16.33
4	36.75	36.19	35.60	35.20	34.55	34.08
5	66.10	65.04	64.02	63.12	62.15	61.27
6	110.4	108.6	106.8	105.3	103.6	102.2
8	232.0	228.3	224.7	221.3	218.0	215.0
10	424.0	417.2	410.6	404.9	398.7	393.1
12 O. D.	584.1	575.0	565.9	557.8	549.0	541.8
12 I. D.	703.5	692.5	681.5	671.7	661.3	652.5
16 O. D.	1,338.0	1,281.0	1,260.0	1,242.0	1,223.0	1,206.0
18 O. D.	2,147.0	2,058.0	2,023.0	1,995.0	1,964.0	1,937.0

Table of values of K_2 (for use with formula 5).

The writer has found the above table of values of the squares of absolute pressures for values from 0 to 400 lb. (gauge) very useful in saving time in calculating.

By means of the formulas given, it is possible not only to calculate the proper sizes for new lines to be laid, but also to keep a continuous check on meter readings. For this purpose, it is necessary to select times when pressure conditions at both ends of the line are quite steady. The pipe-line flow formula will not check with meter readings during periods when a line is being "packed" with gas, or the reverse.

Growth of the Federal Reserve System

Seventy-five State banks or trust companies were admitted to the Federal Reserve System in September with aggregate capital of $28,918,000, surplus of $32,050,000 and resources of $448,728,000. This brings the number of State institutions, that is, banking institutions other than national banks, now members of the Federal Reserve System up to 250, with total resources of $5,000,000,000.

TABLE OF SQUARES OF ABSOLUTE PRESSURES. B = 14.4 LB.

	0	1	2	3	4	5	6	7	8	9	
0	207.36	237.16	268.96	302.76	338.56	376.36	416.16	457.96	501.76	547.56	0
10	595.36	645.16	696.96	750.76	806.56	864.36	924.16	985.96	1049.8	1115.6	10
20	1183.4	1253.2	1325.0	1398.8	1474.6	1552.4	1632.2	1714.0	1797.8	1883.6	20
30	1971.4	2061.2	2153.0	2246.8	2342.6	2440.4	2540.2	2642.0	2745.8	2851.6	30
40	2959.4	3069.2	3181.0	3294.8	3410.6	3528.4	3648.2	3770.0	3893.8	4019.6	40
50	4147.4	4277.2	4409.0	4542.8	4678.6	4816.4	4956.2	5098.0	5241.8	5387.6	50
60	5535.4	5685.2	5837.0	5990.8	6146.6	6304.4	6464 2	6626.0	6789.8	6955.6	60
70	7123.4	7293.2	7465.0	7638.8	7814.6	7992.4	8172.2	8354.0	8537.8	8723.6	70
80	8911.4	9101.2	9293.0	9486.8	9682.6	9880.4	10080	10282	10486	10692	80
90	10899	11109	11321	11535	11751	11968	12188	12410	12634	12860	90
100	13087	13317	13549	13783	14019	14256	14496	14738	14982	15228	100
110	15475	15725	15977	16231	16487	16744	17004	17266	17530	17796	110
120	18063	18333	18605	18879	19155	19432	19712	19994	20278	20564	120
130	20851	21141	21433	21727	22023	22320	22620	22922	23226	23532	130
140	23839	24149	24461	24775	25091	25408	25728	26050	26374	26700	140
150	27027	27357	27689	28023	28359	28696	29036	29378	29722	30068	150
160	30415	30765	31117	31471	31827	32184	32544	32906	33270	33636	160
170	34003	34373	34745	35119	35495	35872	36252	36634	37018	37404	170
180	37791	38181	38573	38967	39363	39760	40160	40562	40966	41372	180
190	41779	42189	42601	43015	43431	43848	44268	44690	45114	45540	190
200	45967	46397	46829	47263	47699	48136	48576	49018	49462	49908	200
210	50355	50805	51257	51711	52167	52624	53084	53546	54010	54476	210
220	54943	55413	55885	56359	56835	57312	57792	58274	58758	59244	220
230	59731	60221	60713	61207	61703	62200	62700	63202	63706	64212	230
240	64719	65229	65741	66255	66771	67288	67808	68330	68854	69380	240
250	69907	70437	70969	71503	72039	72576	73116	73658	74202	74748	250
260	75295	75845	76397	76951	77507	78064	78624	79186	79750	80316	260
270	80883	81453	82025	82599	83175	83752	84332	84914	85498	86084	270
280	86671	87261	87853	88447	89043	89640	90240	90842	91446	92052	280
290	92659	93269	93881	94495	95111	95728	96348	96970	97594	98220	290
300	98847	99477	100109	100743	101379	102016	102656	103298	103942	104588	300
310	105235	105885	106537	107191	107847	108504	109164	109826	110490	111156	310
320	111823	112493	113165	113839	114515	115192	115872	116554	117238	117924	320
330	118611	119301	119993	120687	121383	122080	122780	123482	124186	124892	330
340	125599	126309	127021	127735	128451	129168	129888	130610	131334	132060	340
350	132787	133517	134249	134983	135719	136456	137196	137938	138682	139428	350
360	140175	140925	141677	142431	143187	143944	144704	145466	146230	146996	360
370	147763	148533	149305	150079	150855	151632	152412	153194	153978	154764	370
380	155551	156341	157133	157927	158723	159520	160320	161122	161926	162732	380
390	163539	164349	165161	165975	166791	167608	168428	169250	170074	170900	390
	0	1	2	3	4	5	6	7	8	9	

Present Situation Will Prove in the End the Greatest Blessing to Public Utilities that Has Ever Happened

Henry L. Doherty Foresees General Acceptance of "Readiness-to-Serve" Charge—For Years After People Will Have Truer Appreciation of What Utilities Do for Them

In these days of soaring prices for raw materials it is not a comfortable thing to be unable to fix your own selling price, but be forced to wait until a State commission or a municipal body is made to see the necessity for an increased price, asserts Henry L. Doherty in *The Spur* for Jan. 15. When the railroad situation became desperately serious, ways were found to take care of it. Ways will be found to take care of the situation that now faces many of the public utilities. It will not require the drastic action which was necessary in the case of the railroads, for there are many methods whereby relief may be secured.

I think the present situation will in the end prove the greatest blessing to the public utilities of anything that has ever happened. The public has established its right to have public utility charges reduced if they were unfairly high, and they must now be good sports and consent to have them increased if they are unfairly low. The people are already getting an appreciation of what public service means as never before. They realize that they are dependent upon these companies for the necessities and comforts of life and no longer regard them as mere profit-takers, and for many a year after this war is over the people will have a truer appreciation of what these companies do for them. Reforms can be secured under these conditions that have heretofore seemed very remote.

The great bulk of the customers of a gas or electric plant never have paid as much as the expense they occasioned, and for the lack of co-operation on the part of gas and electric men no exact agreement has ever been reached as to the requirements which should be demanded. The stress of the present situation should bring about such an agreement, and, properly pushed, we should be allowed to reform our methods of charging so that every customer will pay all of the expenses he occasions—and if this is done, even at war prices, we can furnish the communities, as a whole, service at a lower price than we have served them heretofore and still make as much profit as we made in past years.

Rational Method of Charging

A rational method of charging must be based not

only on the current or gas consumed, but also on the rate of supply demanded by each customer. Gas and electric companies must refuse to give service as a mere matter of convenience to the customer.

The absurdity of allowing a power user to generate his own current as long as he has a supply of coal, and then, when his supply of coal is exhausted, to draw on the central station and simply pay for the current he consumes has been brought home to us. Also the absurdity of permitting the customer who ordinarily uses coal for his heating processes to draw on the gas company for gas when he no longer has coal has been brought home to us. If customers want the right to demand service they should pay for that right.

The companies with which I am connected will make an insistent demand that they be allowed to apply the "readiness-to-serve" method of charging universally for gas and electric service. Gas and electric companies furnish something more than merely so many thousand cubic feet of gas or so many kilowatt-hours of electricity. They furnish a service valuable to the customer and costly to the company, and are entitled to be paid for this service aside from the gas or electricity they furnish.

Motor Truck Would Be Paying Addition to Pipe Line Constructor's Plant

Experience Has Shown that It Will Stand the Necessary Wear and Tear and that It Cuts Hauling Costs Almost in Half

By EDWIN DEAN

The motor truck has proved its worth to the gas-main constructor. For use in city streets its value has been practically taken for granted. The only reason that it has not been generally used has been its initial cost.

Those having work to do in rough country, however, have been somewhat skeptical as to its advantage to them, as to whether it could stand the strain of poorly constructed roads and as to its ability to travel over soft ground. Recent performances of motor trucks prove beyond question that it can.

Relegating the Teams to the Background

On a cross-country line of cast-iron pipe, with the construction of which the writer is closely familiar, the pipe hauling and distribution was the big feature. The line crossed through exceptionally difficult country. There were a few hard-surfaced roads, but the greater part of the public highways traversed were ordinary country roads, in some cases even worse than the average. The greater part of the hauls, however, were approximately at right angles to the roads, over cultivated or partly cultivated lands and roughly cleared right-of-way through forest lands.

The original intention was to have the motor truck do only the road part of the hauling, but, due to showings made on a few occasions, when they got ahead of the teams in their work and were sent into the fields to relieve the congestion, this plan was soon abandoned and the motor trucks sent from the railway sidings all the way to their destinations. A great part of the impr ved lands work and practically all of the work through the cleared right-of-way was eventually done by the motor trucks. The teams were used for the most inaccessible places. They constituted an indispensable auxiliary, but were relegated to insignificance as a vital part of the entire job.

Bad weather set in before the contract was much more than half completed. The public roads became almost impassable. Yet the motor trucks were able to keep up their work. On one long stretch the surface was of a clay nature, and was water-soaked and sodden to a depth of 1 ft. or more. The motor trucks traversed this stretch with very little difficulty. Occasionally one of them got mired at exceptionally bad spots and had to be helped out, but these stoppages were remarkably infrequent.

3-Ton Truck to Haul 5-Ton Load

Another stretch the road—since improved—was narrow, uneven as to surface and ran up an especially severe grade. A 3-ton truck was used at this stretch to haul pipes weighing up to 5-tons. The grade was continuous for more than a quarter of a mile, and frequent stops were necessary at wider places to permit traffic from the opposite direction to pass. In addition there were several sharp turns with no chance whatever to manoeuvre, as the road was little more than wide enough to accommodate the truck. The work over this stretch was accomplished with economy and no visible damage to the truck.

On the whole the job was finished at a saving of more than 50 per cent on the contractor's original estimate, and, what is more to the point in this kind of work, without any injury to the truck other than could be repaired promptly by neighboring garages. All of the motor trucks in use stood the strain of the severe going without vital injury.

In City Streets

In determining the worth of the motor truck to the gas-main constructor in city streets, the question as to whether it can stand the strain need hardly be considered. If it stood the going over such country as was encountered on this work it should find asphalted, brick and granite pavements a very smooth track. The question of relative efficiency can likewise be easily dismissed. A team, under very favorable conditions, can average 2½ miles an hour, resting on its return trip. The motor truck could be relied upon for 10 miles an hour easily, and would take a heavier load, without the necessity of having snatch teams established at severe grades to help it up, nor would it have to be nursed along in excessively hot weather.

The two most important questions are as to what to do with the truck when there is no pipe to haul and as to initial cost. In country work the contractor can generally keep hauling continuously until all his castings are on the ground. Then he can send the truck to some other job or rent it out. In city work he is limited to a certain amount of pipe ahead of his work. The hauling is an intermittent task that is with him throughout the job. He may haul for a week, then cease for two weeks or a month.

Moving the Surplus Earth

But the contractor on city work has a good proportion of surplus earth and rock to be hauled away. Sometimes he even has to remove all the excavated material and bring back enough for filling when his pipe has been laid. A rough estimate of the amount that has to be hauled can be readily calculated for each foot of trench. If the motor truck could be made readily convertible it could find a continuous use in this work between intervals of hauling. Such conversion in its simplest sense could consist of a box body that could be mounted quickly—it would not pay to spend $10 for labor to make the truck usable for one day's dirt hauling—the sides of which should not be so high as to be out of reach of the shoveller and which could quickly dump its load.

The matter of initial cost will trouble most gas companies. Distribution work does not require a very considerable outlay for any one part of the necessary equipment as a general thing. Derricks, costing usually less than $100 each, furnaces, picks, shovels, wheelbarrows, calking tools, a boiler, rock drills, sledges, hammers, a light wagon or two and a few teams and trucks —most of his teams are hired—and such items are general run of plant for main laying. Sometimes a portable air compressor may be purchased, and perhaps a trench excavator, and on some jobs steam pumps and sheeting hammers, but the work does not require heavy equipment and an expenditure of over $1,000 for any one part of it is exceptional.

The logical every-day truck for the gas-main constructor would be the 3-ton size. A 48-in. line is not so frequent or so long that the truck would not stand the strain of an overload beyond its rated capacity. Less diameters than these would fall within the rated capacity, and larger diameters are so infrequent that it would not be economical to make provision for them. Such a size of truck would not be impracticable for such dirt moving as is required in pipe line trench work.

Wartime Developments Have Greatly Enlarged Horizon of British Gas Industry

War conditions have conspired to open the eyes of the gas industry to its opportunities in a way that it probably would have taken many years to have accomplished otherwise, states the British *Gas Journal*. The needs of the country and its Allies for the materials for high explosives and fuel oils initiated developments. The oil-washing of town gas for the extraction of crude benzol, and its constituent toluol, proved the suitability, in respect of calorific power, of gas so treated for town supply, providing the incombustible gases were kept to a minimum. This, as already intimated, led to the consideration of the dilution of a well-made coal gas by blue water gas and by steaming in vertical retorts, by which results have been obtained which show that economy is resident in these proposals. Further, it is seen that a higher carbonizing efficiency than formerly is possible with steaming, with good effects upon the quantity of secondary liquid products—the result being that a gas of excellent combustible quality in increased quantity is obtained per ton of material handled, thus promoting fuel economy, notwithstanding that, say 1 to 1½ gallons of crude benzol are extracted from the gas. The work that has been going forward has also shown the possibility of increasing considerably the quantity of fuel oils produced. In this connection users of internal combustion engines for vehicular purposes and for stationary engines have their eyes upon the gas industry as a potential home source of liquid fuel in competition with petrol. The shortage of petrol, too, has resulted in a large adoption of gas for motor vehicles, and the prospect is that, owing to its cheapness for this purpose—at any rate for commercial motor vehicles—coal gas is likely to have a permanent innings in this respect. The year, too, has witnessed a larger adoption of private tar-distillation plants, and a growing feeling that something useful can be done co-operatively. This has been accompanied by a desire on the part of the old firms of distillers to stem this tendency by entering into arrangements with the industry for a better sharing with the producers of the profits from tar. The difficulties with coal transport have found coke a welcome fuel. Larger experiences have been obtained with it and breeze especially for steam raising, and if care is taken there is a prospect of a much larger market than heretofore for this primary by-product, particularly for electricity generation. There is also a well-grounded opinion that the gas industry will become more intimately associated, as fuel suppliers, with their chief rivals. Yet the economic interests of the gas industry will be served. The compulsory use by home agriculturists of sulphate of ammonia through the absence of other fertilizers, should have a marked effect upon the future of the home demand. These developments, in the aggregate, promise a considerable influence upon the future of the gas industry. They have enlarged our horizon, and in them it is hoped that considerable compensations will be found hereafter for the difficulties which the war has engendered for the industry in many ways.

War Savings

Thrift Stamps and War Saving Stamps are the most democratic of investments and America expects every American to show love of republican institutions by investing in this democratic security. The aggregate amount of the investments and the number of investors in these War Savings securities are in a way the answer of the people of this great democracy to the call of the cause of democracy throughout the world and the vindication of civilization and humanity.

They afford every person, however humble and however small his means, the opportunity to contribute his part, to do his bit, in this great struggle against the military masters of Germany who seek to dominate the world in contempt of justice and right and freedom and without conscience and without mercy.

Surely every American desires to have a part in the defeat of autocracy and the success of liberty and right.

Suit Begun at Chicago Involving $10,000,000 Refund

There will begin next Monday, before Circuit Judge Pinckney, legal arguments on Chicago's suit seeking to compel the Peoples Gas Light & Coke Company to return to consumers approximately $10,000,000 alleged overcharges which the city claims were made during five years preceding the present ordinance.

How the Gas Companies Are Helping the Nation

THE CONSOLIDATED GAS COMPANY, of New York, has the following employees' names included on its Honor Roll:

J. W. McLaughlin.....Naval Militia
Thomas McLaughlin.....Navy
A. J. Metzger.....13th Coast Defense
Carl Meyers.....Regular Army
Harry McMasters.....10th Infantry

Vincent McQuade.....71st Infantry
F. J. Miller.....71st Infantry, N. Y.
J. Montfort.....71st Infantry, N. Y.
J. Moran.....22nd Engineers, N. Y.
William Moran.....12th Infantry

Martin Morrissey.....69th Infantry
David Morrison.....69th Infantry
F. Mueller..... Engineer Corps, Army
W. Mulhall.....22nd Engineers, N. Y.
James Murphy.....National Army

Michael Murphy.....12th Infantry
P. Murphy.....National Army
James E. Murray.....10th Infantry
Thomas Murray.....69th Infantry
P. Murtaugh.....22nd Engineers

M. Nallon.....1st Field Artillery, N. Y.
J. Naughton.....2nd Field Artillery
James T. Neary.....71st Infantry
David M. Newman.....Aviation Corps
R. Newport.....Army

Charles Niblack.....Officers' Training
C. W. Nickerson.....Navy
W. Nolan.....23rd Infantry, N. Y.
Christopher O'Brien.....National Army
Owen J. O'Brien.....10th Infantry, N. Y.

Jeremiah O'Connor.....National Army
Philip O'Connor.....12th Infantry, N. Y.
M. O'Connor.....Coast Artillery
Edward Ohlrich.....Navy
Daniel O'Neill.....National Army

George J. O'Neill.....7th Infantry
P. Owens.....National Army
Charles Palmer.....Regular Army
Illuminato Patiri..... Italian Army
Patrick Pettit.....National Army

R. Phair.....12th Infantry, N. Y.
Charles Popke.....9th Coast Defense
Patrick Porteus.....12th Regiment
Everett G. Post.....Naval Reserve
James Proper.....Army

G. Putz.....Navy
J. Quilty.....69th Infantry, N. Y.
William J. Rae.....71st Infantry
Richard Reilly.....Navy
Gustav Reinhardt..... Naval Reserve

A. Rehm.....71st Infantry, N. Y.
T. Reidy.....National Army
C. Reynell.....Officers' Training
T. S. Riley.....12th Cavalry, Regular Army
John Riordan.....Army

James P. Roach.....8th Coast Defense
Claud Roche.....2nd Field Artillery, N. Y.
Walter Rogers.....National Army
V. Rokovitcz.....Regular Army
E. Roth.....National Army

George Romer.....Naval Militia
James Rowan.....12th Infantry, N. Y.
H. J. Russell.....Coast Artillery
P. Russo.....National Army
C. H. Rust.....Squadron A, N. Y.

THE ANDERSON CITY GAS COMPANY, of Anderson, S. C., employees are all members of the Red Cross, and took an active part in Red Cross Day. Several of them took Liberty Bonds in the first campaign. The following two employees are in the draft age, and expect to be called soon: Ned Stevenson, bookkeeper and salesman, and Vance Crawford, gas fitter, both of them being in Class No. 1.

THE WOLCOTT GAS COMPANY, of Shinglehouse, Pa., has invested $1,000 in the Liberty Loan Bonds and contributed $100 to the Red Cross. G. D. Appleby is manager of the company.

L. G. MANN, who recently was elected assistant secretary of the Atlanta Gas Light Company, Atlanta, Ga., has enlisted as yeoman in the hospital unit of the Naval Reserve, and is subject to call when he is needed. He went to his home in Newport, N. C., to spend the holidays, but will return soon to continue his duties in President Arkwright's office until called to the colors.

HAROLD DONOVAN, formerly employed in the service improvement department of the Rochester Railway & Light Company, of Rochester, N. Y., enlisted in the navy to do his bit over a year ago. Since his enlistment Mr. Donovan has been promoted to gunner's mate on the battleship Rhode Island.

SIDNEY N. LEES, formerly of the New Bedford Gas & Edison Light Company, of New Bedford, Mass., is now somewhere in France.

Former Haverhill Employee Killed in Action

George Beker, who about five years ago entered the employ of the Haverhill Gas Light Company, of Haverhill, Mass., has fallen a victim of Teutonic aspirations. He obtained an indefinite leave of absence in March, 1917, and enlisted with the 85th Canadian Highlanders. He was about twenty-six years of age, and is the first known Haverhill man to have been killed in action on the blood-stained fields of France.

THE SAVANNAH GAS COMPANY, of Savannah, Ga., has on its Honor Roll the following employees' names:

Joseph G. Altick.....Co. C, Coast Artillery, Ga. N. G.
William R. Davis.....Battery C, 1st Ga. Artillery
Mortimer C. Hough.....Co. L, 1st Ga. Infantry
Walter S. Ingle.....Nat. Guard, Camp Hancock, Augusta, Ga.
F. W. Konnemann.....Co. H, 1st Ga. Infantry
John M. Richardson.....Co. L, 1st Ga. Infantry
M. T. Wells.....Co. I, 1st Ga. Infantry

The Effect of Proper Burner and Appliance Design on Industrial Sales

Progress in Burner Development—Premixing Gas With Air—Blowers—Two Kinds of Fan Blowers

By GILBERT C. SHADWELL

It is but a few years ago that appliances were in their very crudest state. Many of the burners used were "home-made" and were exceedingly inefficient.

To-day the leading manufacturers have developed burners and appliances which are long past the trial stage, and their products are being used in very large quantities throughout the country. A particular burner or appliance is now made for each of a very great number of the many uses to which gas can be put. In the same way that a gas water heater is for a definite purpose, and can be relied on to do the work better than in any other way, so a soft-metal furnace, cauldron furnace, oven furnace, china kiln or any other definite appliance may be relied upon to do that work for which each is manufactured.

Temperatures Higher Than 1,000 Deg. Fahr.

In many cases the work to be done may be accomplished by means of an atmospheric burner, but for reasons which are well known to most readers, air under pressure is necessary for gas-heated appliances where temperatures above 1,000 deg. Fahr. are needed or where flue conditions warrant it.

It may be desirable briefly to review the matter of blast appliances at this point, as the subject is one of particular interest. In the case of the ordinary Bunsen burner a part of the air (primary air) necessary for the combustion of the gas is premixed with it, this air being entrained by the velocity of the gas passing out of the orifice. The remainder of the air (secondary air) required for complete combustion is supplied to the flame itself.

The result of this modification is to reduce the size of the flame, to eliminate free carbon from it and to increase the flame temperature, thus giving a higher temperature to the products of combustion, which is of great importance in the use of gas as a fuel.

Premixing Gas and Air

In certain cases it is practically impossible, or only possible to a limited extent, to supply air to the flame itself. It is therefore necessary to premix all or almost all of the air required for complete combustion. This obviously cannot be done by entraining the air with gas under common pressures, so that it has to be accomplished by means of air under pressure.

Pressure blowers are broadly of three classes:

1. Fan blowers.
2. Positive pressure blowers.
3. Piston air compressors.

The first kind (i. e., fan blowers) are relatively cheap in first cost, easy to maintain and are most inexpensive to operate; in fact, 1/10-hp. motor is large enough to run a pressure fan of sufficient air capacity for 2,000 cu. ft. of gas per hour.

Fan blowers are of two kinds—volume and pressure. Volume blowers are intended, as their name indicates, to deliver a relatively large volume of air at a low pressure, up to, say, 4 oz. per square inch. Pressure fan blowers are similar to those of the volume type, except that they will supply air at a greater pressure. Positive pressure blowers are also of two types, involute and movable vane. They are usually used when a pressure greater than ½ lb. per square inch of air is required.

Piston air compressors are generally used where pneumatic machinery is to be operated. They are capable of supplying air up to about 150 lb. per square inch, and only interest the gas man who may find it desirable to use such an existing air supply.

Advantage of Fan Blowers

Originally, almost all pressure appliances were built for positive pressure, but later experience has shown that either by placing a pressure fan blower near to the appliance or providing suitable air lines very satisfactory results may be obtained in a vast number of cases, especially if the combustion chamber, burner or appliance is designed for it. An enormous saving in first costs and costs of operation has resulted from this practice.

If the whole layout is properly taken care of, a fan blower can almost always displace one of the positive pressure type.

Many factors thus enter into the design of burners alone, besides the great amount of experience which is necessary in making definite appliances.

The manufacturers of industrial gas appliances have been quick to see the different needs of the various trades, and they have profited by their experience. It need hardly be remarked that the manufacturer needs every support to enable him to continue to improve his product.

Prospect of 100,000,000 Tons of Coal Coked in By-Product Ovens in United States in Not Distant Future

We will probably see in the not distant future 100,000,000 tons of coal coked yearly in the United States in by-product ovens, from which we may expect a yield of over 700,000,000 gal. of tar (16,000,000 barrels) and about 250,000,000 gal. (6,000,000 barrels) of light oils, declared I. N. Knapp in a paper presented recently at the Engineers' Club, Philadelphia. This will certainly be a notable increment to our total supply of hydrocarbon oils.

After the war the industries of the United States will control, in the coking of coal by the by-product method, a source of liquid hydrocarbons sufficient in quantity and quality to compete for and supply the world's demands for medicines, dyes, chemicals and other coal-tar products.

Benzol has been proved valuable to mix with gasoline for use in the automobile, the mixture giving better results than the straight gasoline.

Alcohol is looked upon in some quarters as the ultimate fuel for small mobile internal-combustion engines.

It is reasonable to expect that the world's production and consumption of hydrocarbon oils will, before many years, exceed 1,000,000,000 barrels per year.

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Being Frank with the Public

Within the past few months there have been many rate increases throughout the country. The gas companies have had good reason to ask such relief, and commissions have manifested, on the whole, a gratifying appreciation of the difficulties they were confronted with. Also there was manifest in several cases a real reluctance on the part of gas companies to take the step, and in most of these cases the public plainly indicated its belief in the integrity of the company—that its reluctance was real and not assumed.

The managements were seeking one end—an increase in rates. They had ample and easily-proved reasons for applying for these increases. Indeed, had they not done so under the present abnormal conditions they would have given cause, as one commissioner put it, for suspicion that, under normal conditions, they had been earning more than a fair return on their investments.

The obvious means, it would seem, that they should have taken to attain their ends would have been to frankly state the facts. There could be no more powerful argument presented in such a case than the present situation of the majority of gas companies described in concise, non-technical terms such as would be clear to the public comprehension.

There are, however, in the country a number of managements which lack confidence in the public. The predominating minds in these managements have at some time or another, or perhaps several times, been the victims of some unjust legislation or the target for the shafts of some demagogue aspiring to public preference on the strength of misrepresentation rather than on merit. It is natural that such men should be chary at accepting at face value the results obtained by those who have followed the policy of taking the public into their confidence.

Gas is a technical product. Yet the language of the gas industry is not so technical that it cannot be so transposed as to make its problems clear in a general sense to any reasonably-educated human being. The public can visualize a thousand cubic feet of gas clearly enough to feel that when it buys that volume it is buying a concrete thing, almost as clearly as it comprehends the term "a pound of butter." Yet the public does not know that these thousand cubic feet are measured under a definite pressure; that if the pressure were lower the gas might occupy two thousand cubic feet of volume say. Nor is such a knowledge necessary.

At a recent hearing the chairman of a commission expressed a doubt as to whether the public *could* comprehend the difference between a candle-power-standard gas and a heat-unit-standard gas. The American Gas Engineering Journal cannot concur with him in this view. It believes that the Chicago experience, especially, is diametrically opposed to it. It does not matter that the means of determining how many candles a gas repre-

sents, or how many heat units. It is enough that the public realize the difference between direct lighting value and heat value—a distinction that, even to the non-technical mind, should not be difficult to appreciate—and that direct illuminating power has no significance in gas used as it should be for illuminating purposes.

On the whole this journal is convinced that the problems and difficulties of the gas industry can easily be made clear to the public. It believes the public is, on the whole, fair-minded and just. As a remedy for all ills and attacks to which a utility is liable it believes most earnestly in the efficacy of an appeal to the people. If we seek any changes in our franchises or adjustments in our rates, let us seek them frankly, tell the people what it is all about and the reasons thereof. With the weight of public opinion behind it, the utility has little to fear, even from the most partisan commission or the most mendacious of demagogues.

A Word to Municipal Ownership Agitators

Municipal ownership agitators—gentle souls—you mean no harm, and your utterances are mainly the vaporings of the head rather than the sentiments of the heart. You do not want to shoulder the burdens and perplexities of supplying gas in unprecedented quantities in unprecedented times with the spectre of a possible inadequacy in the coal supply always in the back of your minds.

And where is the harm? Others have agitated this matter in the past—some, incidentally, with a gratifying profit to themselves—and, though a few utility men might have been worried momentarily, the utilities continue rendering their service adequately and without outwardly manifesting discouragement.

But these are different times, friend agitator. Some of us realize it. Apparently you do not.

There is no utility that we know of that is working very much for the profits of the present. They do not, even at the best, exist.

Various companies have obtained relief in rates; then settled back for a breathing space, thinking that for the time that all is well. Then, lo and behold, their relative complacency is sadly jarred. The rising costs they had expected to forestall continue to rise. Their rate relief is not a relief at all. It is merely a respite.

So, as we have said, on the whole the utilities are working for the future. There is a temptation to-day to let the public become forgetful of the value of gas service. If we keep on enlightening it of its convenience and economy we merely add to our burdens. It will insist upon being tied on to the lines. And it costs something to connect new customers, and more than it is worth to us, too frequently, to supply them.

"But no," says the well-managed company, which regards itself as a fixture in the community, "we cannot permit the community to forget gas. We must keep it alive to its value as a service. The times will pass and, in the future, we will recoup the losses of the present."

But to the company which is kept constantly reminded by your carpings that its existence is but transient, the temptation to try to save something out of the mix-up of the present is apt to prove irresistible. We do not say that it will, but it is possible. There is a manifest reluctance on the part of all sane men to hurl dollar after dollar into a bottomless pit from which there is small hope of recovery.

Why Pick on New York

A contemporary, which apparently read and took to heart our editorial "Relinquishing the Profits Without Ridding Ourselves of the Burden"—published in our Jan. 5 issue—has interested himself energetically in repeating to the gas field the dangers we then pointed out.

We accept with gratitude the implied compliment in this action of our contemporary, but deplore the basic facts upon which he builds his argument. Gas men who are thoroughly in touch with conditions in the field will know that these facts as given indicate nothing, and may lose interest in the subject, being convinced that the grave dangers revealed are but the offspring of a highly developed journalistic imagination. Thus a needed warning would be unheeded.

Under the head of "Dealer 'Activity,'" with the true in many cases, but not altogether true in the case he apparently has in mind, sub-head, "Outsiders Step in and Sell Goods When Companies Pause in Selling," our contemporary points out that "the alert department store managements have again entered the gas appliance field with their bargain goods of all shapes and sizes."

He asks, "What is the reason for this resurrection of a dead and buried adjunct of the gas business?"

"Has the gas company's commercial department in these localities been ruined, submarined or sunk?"

The question now arises, "Which localities does our contemporary have in mind?

He demonstrates: "To give an idea of what the department stores are doing in the gas company's field, a news item appearing in an Eastern paper is republished herewith:

" 'One effect of the present cold weather has been to make all kinds of heating apparatus about as scarce in the local stores as riders on the top deck of a Fifth Avenue bus. Oil and gas heaters are in constant demand, according to store executives, but about the only hope of customers in most of them is that they will be able to discover one that has been returned by a tenant in some apartment house which has succeeded in getting a supply

of coal. While they were yet to be had, the rush for them was not altogether unlike a scene at Yale Field in the days of mass play in football.'"

Our contemporary apparently has reference to the City of New York, and specifically to the Borough of Manhattan. If we are in doubt we have but to turn over a page to his "Current Advertising Review," in which is reproduced an advertisement of Gimbel Brothers, located on Broadway, from Thirty-second to Thirty-third Street, New York City, in which the firm deplores that, due to delayed shipments, it is unable to advertise more oil, gas and electric heaters for sale.

Having determined this point, we cannot but conclude that our contemporary is most unfortunate in the instance he has selected to prove his point.

The gas companies serving the locality he points out have not in the least degree let up in their merchandising of heaters. In fact, it is possible that they have sold more of this class of appliances than in any year in the past. Not even when their sales reached 1,300 heaters a day, and their gas demand almost 50 per cent above normal, did they put up the "Stop" sign.

Further, we might state these companies possibly would have been somewhat set back had the demand for heaters been materially less than it was. They had foreseen such a demand, and, in the spring, had ordered an unusual supply of heaters to meet it. There has been no stoppage even to date in the sales of heaters by these companies.

That in a city of over 5,000,000 inhabitants department stores should have found an eager market for oil, gas and electric heaters in the coldest winter in its history, a condition further complicated by almost famine conditions in coal supplies, is not at all remarkable. In fact, it is scarcely comprehensible that the gas companies, regardless of any efforts they might make, could prevent it.

We have pointed out the dangers of arriving at editorial conclusions on the basis of superficial or hastily considered information to this particular contemporary before.

The gas journals are afforded a unique opportunity to be helpful to their field, due to conditions arising out of the war.

The editorial can be infinite assistance to the man who must decide the problems of the gas industry.

More and more, in the absence of the National Gas Association conventions, are the big figures of the gas industry turning towards it in quest of inspiration. They well realize that one whose whole energies are devoted to studying and interpreting the trend of events is well situated to furnish them with this inspiration.

But let one of these men discover that the editorials in any journal are mere vaporings, that their conclusions are not the result of deep and thoughtful study, and he will forever lose confidence in them.

Further, such a discovery on his part in regard to one journal will cause him to view with a certain degree of suspicion the editorials in other journals, thus minimizing to him the value of a service that can be of unquestionable aid to him.

In this particular case, our contemporary has advanced a true conclusion. But he has based it on facts that will lend doubt in the minds of many as to its soundness. In addition he has created a false impression as to the attitude of certain gas companies, which, by the manner in which they have conducted their business under the recent terrible and unusual conditions, have reflected credit on the whole gas industry.

How the Gas Companies Are Helping the Nation

(*Continued from page* 106)

THE NORTHERN INDIANA GAS & ELECTRIC COMPANY, Wabash, Ind., division, has several of its employees in the military and naval service of the United States. The following are among those on the Honor Roll:

Frank Davidson.....Camp Taylor, Louisville, Ky.
John E. Deegan.....Camp Taylor, Ky.
J. E. Finan.....Inf. Gen. Serv. N. G. Recruiting Detachment
A. Fisher.....Camp Taylor, Ky.
L. R. Mottern..... N. G., Co. C, 2nd Ind. Infantry
Ed. Shaughnessy.....U. S. Navy
Bert Smith.....Field Artillery
Howard Soller.....Cavalry
Clarence Stapleton.....Camp Taylor, Ky.

THE SYRACUSE LIGHTING COMPANY, of Syracuse, N. Y., has on its Honor Roll the following employees' names:

Charles F. Bidinger.....Mounted Police for Service in France
William Boyle.....Unknown
Jacob S. Cabler.....Unknown
Jerry Davin..... .Engineers' Corps, U. S. Marine
Frank Glimpe.....Unknown

Fred. C. Hill.....Camp Dix, N. J.
W. E. Lee.....U. S. Marine Corps
William F. O'Brien.....Battery A, 1st N. Y. Artillery
Leonard Schneider.....U. S. Navy
Wm. F. Wenzel.....Unknown

THE MIAMI GAS COMPANY, of Philadelphia, Pa., has spent several hundred dollars in advertising in local papers the Liberty Bonds of both the first and second issues, and their officers have been liberal subscribers. H. G. Van Court is treasurer of the company.

THE BOARD OF PUBLIC WORKS, operating the municipal water, gas and electric plants at Tallahassee, Fla., has five of its employees subject to draft. The employees have invested considerably in the Government loans and Red Cross campaigns. D. R. Swing is superintendent of the plant.

Patents Pertinent to Gas Industry

Pilot Light Provided for Stove or Open Flame Illuminating Burners

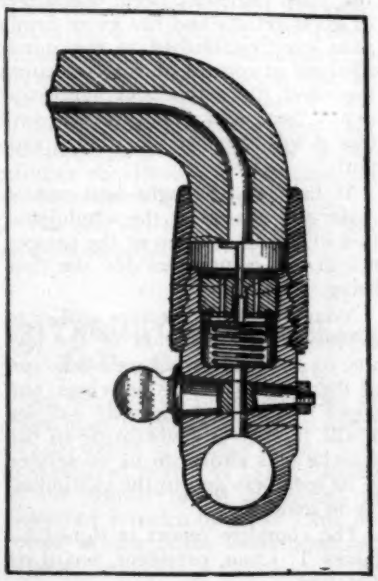
Patent No. 1,229,742; described in Patent Office *Gazette*, June 12, 1917, page 510. Charles L. Gisler, Sisterville, W. Va. Filed Dec. 10, 1915. Serial No. 66,101. (Cl. 67-16.)

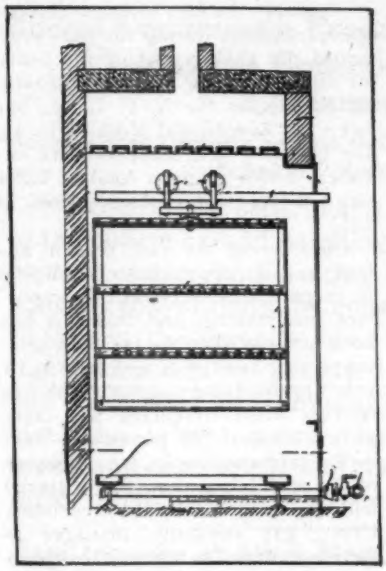
A pilot tube extends from beyond the main cock to the gas outlet, the pilot consisting of a hollow, semispherical casing having its under wall concaved and provided with perforations.

Coupling for Flexible Gas Tubing Connection Provided with Safety Device

Patent No. 1,230,026; described in Patent Office *Gazette*, June 12, 1917, page 601. Barzillai Pullen, Camden, N. J., assignor to Alexander Leckey, Camden, N. J. Filed June 23, 1916. Serial No. 105,488. (Cl. 137-30.)

This device consists of a sleeve with a coupling connected to it. A casing is connected to the gas supply, and is also connected to the sleeve. In addition to the manually operated valve, a spring operated valve is placed in the valve chamber, which is maintained in an open position by a small foot attached to the coupling. When the coupling becomes disconnected the spring valve operates to close the gas way.





Smoke House Uses Gas to Cure Meats

Patent No. 1,229,298; described in Patent Office *Gazette*, June 12, 1917, page 361. Conrad T. Lenzke, Minneapolis, Minn. Filed Oct. 2, 1916. Serial No. 123,287. (Cl. 34-19.)

In this smoke house a pan which contains sawdust is placed near the floor of the house. A central air passage and the gas burners are located below the bottom of the pan, while air conduits lead from the atmosphere and terminate near the central opening of the pan in order to supply air to the pan.

Gas Radiator Provided with Baffle Plates Above Burner

Patent No. 1,229,451; described in Patent Office *Gazette*, June 12, 1917, page 412. August J. Hartfield, Los Angeles, Cal., assignor to Helen A. Hartfield, Los Angeles, Cal. Filed July 8, 1916. Serial No. 108,099. (Cl. 126-91.)

In this gas radiator a central burner section has a partition wall dividing it into a combustion chamber and an off-take flue for waste gas. The gas burner is placed in the lower part of the combustion chamber, a baffle plate being placed just above the burner. This baffle plate has upwardly converging walls and an open top. An air inlet port is located below the burner, while auxiliary air inlet ports are placed opposite the baffle plate. A number of radiator sections are arranged at the side of the central burner section and connected at their top and bottoms with this section.

Pipe Hanger Designed for Use with Metal Beams

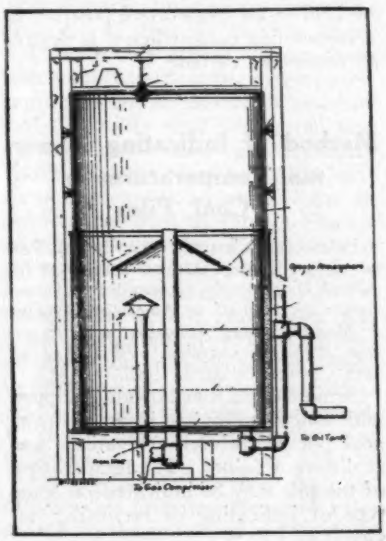
Patent No. 1,224,309; described in Patent Office *Gazette*, May 1, 1917, page 70. Paul Lupke, Jr., Trenton, N. J. Filed Sept. 30, 1916. Serial No. 122,958. (Cl. 248-32.)

This hanger consists of a piece of rod steel bent in such manner that it engages the lower flange of the beam and also the pipe. A set screw is used to obtain the desired tightness.

Gas Trap Provided with Double Walls

Patent No. 1,226,913; described in Patent Office *Gazette*, May 22, 1917, page 1088. Charles C. Scharpenberg, Bakersfield, Cal. Filed Aug. 2, 1916. Serial No. 112,673. (Cl. 183-43.)

This gas trap consists of a fixed tank open at the top and provided with double walls, these latter forming a space which contains a liquid seal. A floating tank is sealed by this seal. A pipe supplies gas and air to the lower tank, while outlets are provided, one to the oil tank and the other to the gas compressor.



Portable Heater Equipped with Flue

Patent No. 1,228,519; described in Patent Office *Gazette*, June 5, 1917, page 50. Berry A. Baxter, Mansfield, Ohio. assignor to New Method Stove Company, Mansfield, Ohio, a firm composed of Henry H. Sanford, Bernhard R. Ahrent, Edwin D. Baxter, and Berry A. Baxter. Filed Aug. 19, 1915. Serial No. 46,238. (Cl. 126-89.)

This portable space heater contains a deflector plate which terminates at the same height as the front opening. The gas burner is also arranged at this height. A series of baffle plates, in conjunction with a flue, assures an even distribution of heat without danger of noxious products.

Acetylene Generator Consists of Three Chambers

Patent No. 1,224,822; described in Patent Office *Gazette*, May 1, 1917, page 251. Milford Leroy Williams, Revere, Mo. Filed May 1, 1916. Serial No. 94,822. (Cl. 48-53.1.)

This acetylene generator consists of a casing containing water and two additional adjacent chambers above the water level. One of these contains the carbide and the other contains a water sealed gas bell, freely open to the interior of the casing below the seal. A flat cover fits over the casing, and is made in two parts, one part normally fitting tightly over the carbide receptacle, the other being hinged to the first part and normally covering the chamber containing the gas bell. The gas bell may be held in an inoperative position by a suspending cable when it is desired to renew the carbide.

Method of Indicating Abnormal Temperatures in Coal Piles

Patent No. 1,224,385; described in Patent Office *Gazette*, May 1, 1917, page 97. Alfred D. Kennedy, Greenville, S. C., assignor of one-half to American Machine & Manufacturing Company, a Corporation of North Carolina. Filed May 22, 1915. Serial No. 29,771. (Cl. 177-355.)

A number of thermostats equipped with long handles are inserted in the coal pile at different elevations and at different points. The temperature of the pile may be indicated on some type of indicating or recording device.

N. C. G. A. Educational Work Successful—Question of Amalgamation of Associations Dealt with in 1917 Report

Probably the first of important accomplishments during the past year, states the 1917 report of the board of directors in the February *Monthly Bulletin of the N. C. G. A.*, has been the educational work. During the year 300 new students were enrolled, which makes a total of 2,224 since the present courses started in 1915.

Considering the fact that it has cost to date approximately $50,000 to prepare and carry on this important undertaking, and that this has been accomplished so far on a self-supporting basis, it is well worthy of your approval and support. The five courses when completed will comprise a total of 125 pamphlets—text books, reference books, etc. Because of its prohibitive cost, this material will probably never be reprinted. Every gas company manager is therefore urged to take advantage of the association's offer to enroll his men in these courses and also to subscribe for a complete set of the courses for his company's library before the present supply of material is exhausted.

Industrial Fuel Service

The Industrial Fuel Service Department has been a pronounced success since its start in May, 1916, and the association was particularly fortunate in securing William A. Ehlers for this work.

He has been employed since May, 1916, by thirty-one companies on a total of seventy-five calls, ranging from one to twenty-eight days each. The number of return calls has ranged from one to twelve per company, averaging about five days each.

This service has been self-supporting since its institution. * * *

The report continues with an interesting review of the activities dealing with gas window displays, the national propaganda for food conservation, the new "Thrift" folders, national campaigns and the special committee conference which were held in place of the regular mid-year conference. * * *

The Question of Amalgamation

For some time there has been a growing feeling that the best interests of the industry could be served were the American Gas Institute and the National Commercial Gas Association to amalgamate, thus forming one big working unit conducted along the most economical lines and for the best interests of the business.

During the year, the boards of directors of the two associations submitted this matter to their public policy committees, with the result that a special committee of four men from each association was appointed by the public policy committee, as a joint committee on amalgamation. This committee of eight has formulated a plan for the amalgamation of the two associations. This plan is now before your board of directors for approval, after which it will be placed before the members of the two associations for ratification.

It is believed that this new association could be of great help to the industry in rendering assistance to company members in many of the situations which are arising daily in the conducting of their business, and that the organization would become a general advisory bureau of information to continue and extend the present educational work of the two associations, to stimulate the activities of the gas industry, to collect and disseminate information for this purpose, and to study methods and formulate plans for business development on a much broader scale than has ever been possible under the present arrangement of the two associations working independently of each other.

Your board of directors feels that the past year has been productive of good results and has more firmly than ever established in the minds of those in control of gas companies the need for active and aggressive association work, and we are sure that it will have their continued support.

It has been thought best not to make any change in the administration of the association or the personnel of the committees for the time being.

Your board of directors wishes to express its appreciation of the loyalty of the association members and of their support to its activities, and hopes that the coming year will see a still further advance made in the association's efforts to be of service to its members and to the gas industry in general.

The complete report is signed by James T. Lynn, president, board of directors.

News of the Gas Industry

New Jersey B.t.u. Standard Lowered in Response to War Department Request

In response to a request from the War Department the Public Utilities Commission of New Jersey has made an order, effective at once, permitting a thirty-day reduction in the standard of gas supplied by the Public Service Gas Company from its plants in Newark, Jersey City, Paterson, Trenton and Camden. The present average standard of 600 B.t.u. now required is reduced under the order to 570 B.t.u., with a stipulation that the minimum shall not fall below 550.

The order was made subject to the proviso that all toluol obtained in the manufacture of the gas should be furnished to the United States Government. The Government is threatened with a scarcity of toluol in its munition plants. Lowering of the gas standard will increase the available supply of toluol.

The decision of the board was reached at the conclusion of a hearing resulting from a telegraphic request received by the commission from Lieut-Col. Burns of the Ordnance Department Thursday, Jan. 24.

Several months ago the gas companies tried to get from the public utilities commission permission to lower the standard of gas so that the gas companies might sell to the Government some of the ingredients for munition purposes, but the public utilities commission at that time refused to grant the permit.

The new move is the result of new exigencies produced by the war.

1917 Illinois Coal Mined Shows 24 Per Cent Increase

An increase of 15,000,000 tons or more than 24 per cent in the amount of coal mined in Illinois during 1917 as compared to that of 1916 is shown in the annual report submitted to Governor Lowden by Evan John, director of the State Department of Mines.

Illinois Commission Prepares Tentative Rules Governing the Collection and Handling of Consumers' Deposits

Believes that Uniform System of Credits and Collections Will Relieve Criticism and Protect Utilities Revenue

Declaring its belief that a uniform system of credits and of the collection and handling of consumers' deposits for gas, electric, water and heating service "will operate to relieve considerable criticism by consumers and should also operate to protect the revenues of utilities," the Illinois Public Utilities Commission has prepared such rules in a tentative form and has invited all interested parties to comment on or criticize "the subject matter, language, arrangements, requirements and completeness of the rules" either in writing or at a series of public hearings to be held on the matter.

In a foreword printed in connection with the rules, the commission says:

The experience of the commission since its organization indicates that definite rules and practices, as applied to the establishment of consumers' credits and the handling of deposits made by consumers as a guarantee of the prompt payment of bills, will operate to relieve considerable criticism by consumers, and should also operate to protect the revenues of utilities.

On account of the public nature of their business, utilities are under obligations to furnish service under conditions very different from those which apply to the usual private mercantile business, and it is essential that the utility shall be insured that its consumers have an established credit in those cases in which service is rendered in advance of the receipt of payment therefor. The establishment of rules and regulations governing this matter should operate to prevent the exercise of unjust discrimination against consumers, and it should also operate to keep the item of unpaid or uncollectible bills within limits which may be considered as reasonable and properly to be included in the utility's normal operating expenses.

Having this end in view, the commission has prepared tentative rules governing the collection and handling

Rate Increase at Athol, Mass,

The Athol (Mass.) Gas & Electric Light Company has increased the price of gas 10 cents per 1,000 ft. In explanation of this increase the company issued the following statement recently:

"On account of the unusual increase in the cost of coal, oil and other materials necessary for the manufacture and distribution of gas, it is necessary that the Athol Gas & Electric Light Company ask its consumers to share a portion of the added cost. The price of gas, therefore, will be increased by 10 cents per 1,000 ft., beginning with the January, 1918, bills."

Rate Increase Asked by Southern Counties Company

The Southern Counties Gas Company of California has filed with the railroad commission application to fix reasonable rates for natural gas supplied by the company to Santa Monica, Sawtelle, Ocean Park, Venice, Palms, Culver City.

The company says that the present rates for natural gas now in effect in many of these towns are too low. The rates a month to domestic consumers are $1 a thousand cubic feet for the first 3,000, 90 cents a thousand feet for the next 7,000, etc., with a minimum charge of 50 cents a meter a month.

of consumers' deposits, which may be presented at a public hearing for discussion and criticism by interested parties. The rules which have been so prepared are presented herewith.

TENTATIVE RULES

Rules Governing the Establishment of Credits and the Collection and Handling of Consumers' Deposits for Electric, Gas, Water and Heating Services

1. *Scope and Application.*

These rules and regulations shall apply to the establishment of credits for consumers of electric, gas, water and heating service rendered by public utilities coming within the jurisdiction of this commission and to the collection and handling of deposits made by such consumers for the purpose of guaranteeing the prompt payment of their bills.

2. *Intent.*

It is the intent of these rules to establish definite methods and practices by which the credits of prospective and existing cosumers may be established without discrimination among individual consumers or classes of consumers, and to establish methods for the handling of deposits made by such consumers which shall be equitable as between the consumers and the utilities.

3. *Exemptions.*

If exemption from any of the requirements herein is desired in any particular case the commission or its properly designated officials will consider an application for such exemption when accompanied by a full statement setting forth the conditions existing and the reasons why such exemption is desired.

4. *Saving Clause.*

The adoption of these rules shall in no way preclude the commission from altering or amending them, in whole or in part, or from requiring or authorizing rules containing other provisions whenever it shall be deemed to the public interest so to do. The requirements specified herein shall not relieve any utility of any statutory requirement.

5. *Copies of This Order to Be Kept on File.*

Each utility furnishing electric, gas, water or heating service shall keep copies of this order on file for easy access at each office at which applications for such service are received and shall call the same to the attention of all applicants of whom a credit establishment is required.

6. *Interpretation of These Rules.*

Any utility or any consumer desiring an interpretation of these rules may address the Public Utilities Commission, Springfield, Ill., and will receive prompt reply.

7. *Right to Require the Establishment of Credit.*

Before rendering service to a prospective consumer or upon ten (10) days' written notice to an existing consumer each utility furnishing electric, gas, water or heating service shall require each consumer of metered service (except through a prepayment meter) to establish his credit.

8. *Means by Which Consumer May Establish Credit.*

The consumer will be deemed to have established his credit by compliance with any one of the following conditions:

(a) If he owns the premises in which the service is desired.

(b) If he owns other real estate within the county in which his equity is in excess of twice the estimated periodic bill.

(c) If he furnishes a guarantor for the payment of his bills who is an owner of real estate in the county to the extent set forth under (b).

(d) If he is already a consumer of the same service or any other service rendered by the utility and has paid all bills promptly during the preceding twelve-month period; provided that such bills on the average have been equal in amount to at least one-half the estimated average bills for the service desired.

(e) If he makes a cash deposit in accordance with the requirements herein.

(f) In case a consumer is delinquent by more than twenty (20) days in the payment of any bill to the utility, excepting bills for merchandise or job work, he may be denied the privilege of establishing his credit by means other than a cash deposit. The twenty-day period herein referred to will include the prompt payment discount period. In case a consumer considers a bill unjust, the bill may be paid and the matter referred to the Public Utilities Commission for adjudication.

9. *Amount of Cash Deposit.*

(a) The amount of cash deposit which may be required of a consumer for the purpose of establishing his credit as provided under rule 6-e shall be equal to the average bill (including prompt payment discount) for a periodic billing period plus thirty (30) days.

(b) In the case of a new consumer the average bill referred to in rule 9-a shall be determined by estimate, giving consideration to the average consumption of other similar consumers and the particular conditions attending the individual installation under consideration. However, after the consumer has received service for a period of six months the cash deposit may be readjusted at the option of either party by considering the average for these six (6) months and at the end of twelve (12) months it may be again readjusted on the basis of the twelve (12) months' average.

(c) In the case of an existing consumer the average bill referred to in rule 9-a shall be determined by averaging the bills for the preceding twelve-month period. If the consumer's use of the service has been materially changed during the preceding twelve months the average shall be determined by averaging the bills for the preceding six months' period. If the consumer's use of the service has been materially changed during the preceding six months the average shall be determined as in the case of a new consumer.

(d) A utility may promulgate rules fixing a minimum cash deposit. Such minimum (except for heating and power service) shall not exceed $3 for residence consumers or $5 for business consumers.

(e) The amount of the cash deposit may be readjusted at the option of the consumer or the utility at any time, provided a similar readjustment has not been made during the preceding twelve months. This shall not operate to prevent a readjustment at any time when the character of the consumer's use of the service has been materially changed; neither shall it operate in conflict with rule 9-b.

10. *Period for Which Deposit May Be Retained.*

A cash deposit within the scope of these rules may be retained until the consumer indicates his ability to establish credit by other means or until

(*Continued on page* 116)

Women Take Place of Men Called to War Service

Women Operators Prove Highly Efficient at Welsbach Company's Plant in Gloucester, N. J., Receive Same Pay as the Men Whose Places They Fill

The Welsbach Company's factory is now practically surrounded by shipbuilding plants under control of the United States Government, with the result that most of the men in the machine shops have been drafted or are in the Government shipyard service. This condition necessitated the training of women and girls to fill their places.

GIRLS OPERATE AUTOMATIC AND HAND DRILLING MACHINES WITH DEXTERITY

Selecting the Right Girl for the Right Place

Women from every walk of life now seek and obtain work in factories. The war has brought this about and opened up the opportunity for women into many forms of employment hitherto closed to them.

The two types that give the factory manager the most concern are the wives who are working temporarily to earn a specially coveted sum and the girls who come from homes where their earnings are not needed. Naturally they do not display the earnestness or tenacity of purpose of the self-dependent worker.

Great care must be exercised in selecting women for these new positions. Consideration must be given to their age, weight, height, temperament and home environment. Girls who are a complete failure at one kind of work often make good at once when transferred; girls coming from homes in which the father or older brother are mechanics develop into competent workers very quickly. This may be due to a natural mechanical ability or to a special interest shown in her work by those at home.

Generally speaking, the woman worker in the machine shop is a success. In dexterity and perseverance and in overcoming difficulties they have outdistanced their male predecessors and in many instance have increased the output considerably. Girls in the Welsbach plant are now operating drilling machines, turret lathes, automatic and hand screw machines, milling machines, assembling gas fixtures, soldering fixture parts and doing important work in the plating department. Upwards of 2,000 women and girls are now daily employed throughout the Welsbach plant.

The costumes shown in the cuts were adopted and supplied by the company, primarily as a matter of safety to the operator. It was found if left to the individual operator that many did not come suitably attired to work in and about machinery.

SHOWING COSTUMES ADOPTED AS A MATTER OF SAFETY TO THE OPERATOR

Period of Training

Experience indicates that one week's acquaintance with machine-shop practice is necessary before the new employee becomes familiar with the usual rattle, noise and oil of the modern machine shop. At the end of a month's time they usually develop into valuable workers. At first they are put to work on small machines, and as they develop ability

(*Continued on page* 117)

Illinois Commission Prepares Ruling Concerning Collection and Handling of Consumers Deposits

(*Continued from page* 114)

the service is discontinued and the bills therefor are paid. Attention is called to the fact that by the provisions of rule 8-d if a consumer has paid all bills promptly for a period of twelve months he will have established his credit, and will therefore be entitled to a refund of his cash deposit.

11. *Interest to Be Paid on Deposits.*

On all deposits made for the purpose of establishing credit the utility shall pay interest at a rate of not less than 6 per cent per annum, provided that no interest need be paid on deposits remaining with the utility for less than six (6) months.

12. *Payment of Interest Accruals.*

Interest accrued on cash deposits shall be computed as of Dec. 31 each year, or as of the date upon which the deposit is returned, for all amounts which have been held in excess of six (6) months, and settlement made by one of the following means:

(a) By tendering the amount of the interest accrued to the consumer at a date prior to the ensuing first day of February.

(b) By crediting the amount of interest accrued on the first bill for service rendered subsequent to the ensuing 15th day of January.

13. *Issuance of Certificate of Deposit.*

In each case of a cash deposit accepted under these rules the utility shall issue to the consumer making the deposit a receipt or certificate of deposit showing the date, the amount received, and the rate of interest paid. This certificate must be surrendered when the deposit is returned, or, if lost, the consumer may be required to sign a guarantee protecting the utility against the subsequent presentation of the certificate.

14. *Application of the Deposit to Liquidate Unpaid Bills.*

(a) If any consumer having a cash deposit with a utility shall fail to pay a bill for the service to which the deposit is applicable within twenty (20) days from the date due, the deposit with interest accrued may be applied to liquidate the amount of the bill. The twenty-day period herein referred to shall include the prompt payment discount period.

(b) When the deposit is applied to the liquidation of unpaid bills the utility shall mail a statement to the consumer showing the amount of the original deposit, the amount and dates of the unpaid bills liquidated by the deposit, and the balance remaining. Unless the service has been discounted the utility shall also request the consumer to restore the deposit to the original amount and shall notify the consumer that service cannot be continued unless the deposit is so restored.

15. *Discontinuance of Service for Failure to Establish Credit or Restore a Cash Deposit.*

Service to an existing consumer shall not be discontinued for nonpayment of bills until ten (10) days after the mailing of a notice by the utility of its intention to require the establishment of his credit, or upon his failure so to do to discontinue the service. Service to a consumer who has a deposit with the utility shall not be discontinued for nonpayment of bills until the expiration of five days from the date of mailing or delivering the notice provided for in 14-b, and in case of such discontinuance the remaining balance of the cash deposit with accrued interest (if any) shall be promptly returned to the consumer.

16. *Records of Deposits.*

Each utility collecting cash deposits from its consumers shall maintain a complete record of each and every deposit showing (a) the name of the consumer, (b) address of the premises served, (c) date and amount of original deposit and any additional deposits, (d) date and amount of any refund or application to unpaid bills, (e) the amount of interest paid or credited, with the date of payment or credit, (f) the balance of each deposit including interest accruals as of Dec. 31 each year (and such other dates as interest may be regularly computed). The commission will require to be shown in each utility's annual report the total amount remaining on deposit.

17. *Liability of Guarantor.*

A guarantor standing as surety for the payment of the bills of a consumer shall be required to sign a guarantee. The liability of the guarantor shall not extend for a period greater than five (5) years. The amount of the liability shall be definitely stated in the guarantee, and shall not exceed the amount of the cash deposit which would be required under other provisions of these rules.

California Company Given Permission to Sell

The railroad commission of California has issued an order authorizing the Southern California Gas Company to sell to the Midway Gas Company its rights under a Los Angeles county franchise to lay gas pipes on the route defined in the franchise, and private rights of way obtained by the Southern company in the city of Whittier, upon which is located the transmission line of the Midway company.

The Midway company is given authority to pay $2,910 to the Southern company for the rights of way and expenses. The natural gas transmission line for which the franchise was obtained was constructed by the Southern company for the Midway company and paid for by the Midway company.

In 1915 the Southern company made a contract with the Standard Oil Company to buy natural gas from the Murphy-Coyote fields located near Fullerton, and agreed with the Midway company to build for it an 8¼-in. transmission main from the fields to a point near Lynwood to connect with the Southern company's Long Beach pipe line. The pipe line is built partly along public highways and partly along the private rights of way mentioned.

The transfer, says the decision of the railroad commission, is in line with the policy of the two companies, which are closely allied, that the Midway company control the production and transmission of natural gas from oil fields to the general transmission and distribution systems of the Southern company, the latter to handle the local transmission and distribution and sale of gas in Los Angeles and vicinity.

Philadelphia Output Increases

The sales of gas in Philadelphia by the United Gas Improvement Company through its subsidiary in three months ended Dec. 31, 1917, were 3,135,250,260 cu. ft., compared with 2,810,559,170 in 1916. The total for the year was 11,226,642,160, compared with 10,291,610,660.

"Women Take Place of Men at Welsbach Company Plant

(*Continued from page* 115)

are transferred to the larger machines and more important work, carrying with it the corresponding increased remuneration.

The appearance of the shop where female help is employed is neater. The matter of waste material has shown a decided decrease, due largely to the fact that women operators are naturally careful in their work.

That machine shop work is not objectionable or distasteful to women is proven by the fact that there is now a waiting list of applicants from employees in other departments of the factory.

With women operating there have been fewer accidents, largely due, no doubt, to the fact that the company has introduced every known preventative to safeguard the operator.

The necessity of female labor has brought about many radical changes into the methods of factory life. The Welsbach Company was fortunate in having already adopted many of the up-to-date factory improvements, such as a hospital, with doctor and nurses in constant attendance, a sick benefit fund for those unable to work, a Christmas or saving fund to assist the employee in saving throughout the year. It is estimated that this latter fund will, in 1918, amount to over $50,000. This is in addition to the various Liberty Bond payments. The latest innovation which is keenly appreciated by the employees is the establishment of a restaurant on the "cafeteria" plan and organized to feed the entire factory organization during a half-hour period with good food supplied at cost price.

It is due to improvements of this nature that the personnel of factory women has been so much bettered in the past few years.

Gas Output for New York City Companies Shows Enormous Increase for First 20 Days in January

As an indication of the enormous burden placed upon the gas companies of New York City by the recent low temperatures and the serious coal shortage, the statistics prepared from the records of the Bureau of Gas and Electricity of the Public Service Commission are most informative.

These figures cover the gas manufactured and sent out on the first twenty days in January, 1918, as compared with the first twenty days in January, 1917. In one instance, that of the Brooklyn Borough Gas Company, the consumption increased on one day 116.55 per cent above the same day last year. There were frequent instances when consumption for some of the companies was 60 to 75 per cent in excess of last year's output. The Consolidated Gas system on Jan. 13 sent out an excess of 44.34 per cent over its "sendout" for a similar date in 1917. The Brooklyn Union Gas Company system on Jan. 1, 1918, had an increase of 30.94 per cent over a similar date in 1917, while the New York & Richmond Gas Company on Jan. 14 showed the largest increase of any of the twenty days, when its percentage of "sendout" was 59.54 over that on a similar day in the previous year. The highest increase on any one day of the Bronx Gas & Electric Company was on Jan. 5, when 43.12 per cent increase over normal output was made. The Queens Borough Gas & Electric Company showed its largest increase in the first twenty days of January on Jan. 1, when it sent out 43.28 per cent over normal output. On Jan. 1 the Kings County Lighting Company had its heaviest day, sending out 37.11 per cent increase over the figures for a similar date in 1917.

The total increase in gas output in cubic feet for the period from Jan. 1 to Jan. 20, inclusive, for the several systems is shown in the following table:

	Output cubic feet (first twenty days) Jan., 1918.	Jan., 1917.	P. c. of Inc'se.
Consolidated Gas Co. system	2,543,761,000	2,015,506,000	26.21
Brooklyn Union Gas Co. system	1,192,572,000	1,060,695,000	12.43
New York & Richmond Gas Co.	37,852,600	28,268,600	33.90
Bronx Gas & Electric Co.	16,903,000	13,871,000	21.86
Queens Borough Gas & Electric Co.	17,643,300	14,485,100	21.80
Brooklyn Borough Gas Co.	39,629,000	24,637,000	60.85
Kings Co. Lighting Co.	94,902,000	69,313,000	36.92

Important Meeting to Discuss Lighting Curtailment to be Held in New York City

The Illuminating Engineering Society will hold a general meeting on Thursday evening, Feb. 14, in the auditorium of the Engineering Societies Building, 29 West Thirty-ninth Street, New York City, for the purpose of discussing the question of curtailment of lighting due to the Fuel Administration's conservation movement. At this time also a paper will be presented by Preston S. Millar on the subject of "Lighting Curtailment." This will be discussed by prominent men in the gas and electric industry, representatives from the Fuel Administration and others concerned in the subject. Invitations are being sent to the A. I. E. E. and the American Gas Institute to join in this meeting.

The following is a list of those who have been invited to speak personally or send a representative to discuss this question:

Hon. Albert H. Wiggins, Federal Fuel Administrator for New York.

Harry T. Peters, member of the Conservation and Advisory Committee of the New York State Fuel Administration.

John W. Lieb, chairman of the National Committee on Gas and Electric Service.

Hon. R. E. Enwright, Commissioner of Police.

Hon. Nicholas J. Hayes, Commissioner Department of Water Supply, Gas and Electricity.

Dr. Colman W. Cutler, chairman of the Illumination Committee of the National Committee for the Prevention of Blindness.

Hon. Ernest T. Trigg, chairman of the Committee on Coal Conservation, U. S. Chamber of Commerce.

Dr. Edward B. Rosa, acting director National Bureau of Standards.

L. B. Marks, chairman National Lighting Committee, U. S. Committee on Labor.

Frank W. Smith, chairman Lamp Committee, National Electric Light Association.

The question of the curtailment of lighting is a very important one at present, and facts and figures in this connection will be presented which will be a survey of the present situation throughout the country.

New Jersey Board Allows 25 Cent Service Charge for Several Counties

The board of public utility commissioners has filed reports on the petition of the New Jersey Gas Company for permission to increase its rates. The New Jersey Gas Company serves several municipalities in Camden, Cumberland, Gloucester and Salem Counties.

Except in the boroughs of Vineland and Swedesboro and in Landis Township, the company has been charging $1.50 gross for gas sold through ordinary meters, less 8 per cent discount for prompt payment, and $1.40 net for gas sold through prepaid meters. In the borough of Swedesboro the charge has been $1.50 gross for gas sold through ordinary meters, with 10 per cent discount for prompt payment, and $1.40 net for gas sold through prepaid meters.

In the borough of Vineland and Landis Township, the company's charge has been $1 per thousand cubic feet for gas sold through both ordinary and prepaid meters. The company proposed to charge $1.50 net per thousand cubic feet, except in the borough of Vineland and Landis Township.

The board reports the company as operating at a loss, the loss of 1917 amounting to $16,000. The board also reports that the company should receive from domestic consumers $231,560 per year; that if a monthly service charge of 25 cents is allowed the company will derive from this source $25,000, leaving $206,560 to be derived from the sale of gas, which for the amount of gas furnished would result in a price of $1.25 net per thousand cubic feet. The board, therefore, has ruled that each connected customer shall pay a "readiness-to-serve" charge of 25 cents.

The board states that this schedule is based on present abnormally high costs of operation, and that it will be subject to revision when conditions as to cost of labor and material shall return to those existing in 1916.

As gas is sold in Vineland and Landis Townships by the Citizens Gas Company for $1 per thousand cubic feet, the New Jersey Gas Company filed a separate petition complaining that this rate is less than a proper rate, and that if it is permitted to be maintained it would result in unfair competition with the New Jersey Gas Company. The board was asked to increase this rate. In a report filed upon this petition, the board states that it does not necessarily follow that a just and reasonable rate to be charged for gas by two competing companies, supplying the same territory from different sources, should be the same; that the facts submitted are insufficient for the board to pass upon the question of the justice and reasonableness of the rates of the Citizens Gas Company, and to attempt to do this would be unfair to the customers of the Citizens Gas Company, who have had no opportunity to be heard.

Indiana Company Petitions for Increased Service Piping Charge

Permission to increase the charges for service piping from its mains to the property line has been filed with the public service commission by the Citizens Gas & Fuel Company of Indiana. A date for the hearing will be set later. The charges are to apply to Terre Haute and West Terre Haute. The minimum charge, according to the petition, is to remain at $5, while the company requests a reasonable additional charge based upon the conditions in each case for digging through high embankments or for other conditions involving unusual expense in installing pipe.

Under the present schedule the prices for pipe range from 15 cents per foot for the inch and a quarter pipe to 50 cents for the 4-in. pipe. The new rate, if granted, will be:

One and one-fourth inch pipe, 25 cents per foot.

One and one-half inch pipe, 30 cents per foot.

Two-inch pipe, 35 cents per foot.

Two and one-half inch pipe, 50 cents per foot.

Three-inch pipe, 65 cents per foot.

Four-inch pipe, 90 cents per foot.

The gas company, in its petition, states that on account of the great increase in the price of materials and labor, the prices now in effect are not compensatory and do not, in fact, cover the necessary actual cost. The increase in the schedule is held by the company to be no more than reasonable and adequate to compensate petitioner for the necessary, reasonable and actual cost.

Increased Rate Sought by Framingham, Mass., Company

The Framingham (Mass.) Gas, Fuel & Power Company, a subsidiary of the West Boston Gas Company, which distributes gas to the Framingham Gas Company, Natick Gaslight Company and Marlboro Gas Company, has filed a petition with the public service commission for an increase in rates. A public hearing was to take place Wednesday, Jan. 30, at 10 a. m., in the selectmen's rooms, by the State commission. The old rate for small consumers is $1.40 net.

Request to Reduce Discount Filed by Denver, Colo., Company

A request for permission temporarily to reduce the monthly discount on gas bills from 15 to 10 cents a thousand cubic feet was recently filed with the utilities commission by officials of the Denver (Col.) Gas & Electric Light Company. The new order is asked to go into effect on the consumption of gas starting Feb. 1, and thereafter.

Officials of the company give as their reasons for asking for the reduction in discount, which is in the nature of a raise in gas rates of approximately 6 per cent, that an increase in operating expenses has been brought about by an order of the utilities commission compelling the furnishing of a better quality of gas and the increased cost of all materials, including coal and labor.

The price of gas in Denver is 95 cents per thousand cubic feet, and if the request of the company to reduce the amount of discount is granted, the consumer will pay 85 cents per thousand feet instead of 80 cents, which will increase the gas bill to every family about 12 to 13 cents a month, on the basis that the average monthly consumption per family of gas is 2,500 cu. ft.

THE DONEGAL GAS COMPANY, which furnishes gas in Mt. Joy, Pa., and the surrounding section, has filed an appeal for a new tariff of rates providing for an increase in unit rates for gas consumed and the minimum charge for service rendered, with the State public service commission. The new schedule if granted will become effective on Jan. 31, 1918.

A Bit of Gratitude

The following newspaper clipping reproduced complete shows that New York has at least one appreciative consumer, who is fair enough to record his thoughts. We believe this one is truly representative of a very large percentage of the consumers, whose gratitude is silent but earnest:

HE THANKS THE GAS MAN
Strange Words for a Public Service Corporation

To the Editor of the *Sun*—Sir: I desire through your newspaper to convey my sincere thanks and appreciation to the Consolidated Gas Company for enabling me to exist with some degree of comfort through the various cold spells of this winter.

I live in a bachelor apartment served with intermittent steam heat, and during the very frequent intervals of no steam a quarter in the slot brought a nice cheerful fire in my asbestos fireplace.

It is my honest opinion that the Consolidated Gas Company has been a genuine life saver through this winter crisis. J. A.

Manhattan, Jan. 24.

Commission Favors Increase for New York State Companies

The Public Service Commission, Second District, of New York, has dismissed the complaint of the trustees of the village of South Glens Falls against the United Gas, Electric Light & Fuel Company, of Sandy Hill and Fort Edward, in contesting the restriction in the franchise fixing the rate to be charged for gas sold in the villages of South Glens Falls, Fort Edward and Hudson Falls, the two last-named villages having made similar complaints. In May the company filed with the commission its tariff increasing the price of gas in the village of South Glens Falls from $1.25 to $1.60 per 1,000 cu. ft., and in November the village protested that the increase was illegal because the franchise under which the company operates provides that it shall charge $1.25 per 1,000 cu. ft. The commission in dismissing the complaint says "the complainants rely entirely on the restriction in the franchise in fixing the rate, and do not propose to contest the reasonableness of the increased rate if the matter is decided adversely to them." If the commission determines that a gas or electric company is making unreasonable increases in rates, it has the power to revise and reduce them."

St. Louis County Company Seeking Rate Increase

The St. Louis County Gas Company recently filed with the Missouri Public Service Commission an application to increase its rates 10 per cent. A table showing the cost of delivering the gas to the mains was 22.82 cents per 1,000 cu. ft. in 1915; 32.89 in 1917, and an estimate of 46 cents for 1918.

The total operating expense per 1,000 cu. ft., according to the statement, was 68.98 cents in 1915, and since has gradually increased, and it is estimated that it will be 85.47 cents for 1918. The statement says the cost of coal last year was $2.43 a ton, and is $3.13 this year. Coke cost $7.63 a ton last year, and this year it is $9.47, the statement shows. The cost of oil has increased 1½ cents a gallon since last year.

A hearing on the application was to be held at Hotel Statler, Jan. 18.

Wisconsin Company Wants Permission to Increase Rate

The Oneida Gas Company has made application to the State railroad commission for permission to increase the gas rate in Rhinelander, Wis. The application of the gas company has been received by the commission and filed. The date for the hearing is set for Feb. 13, to be held in the office of the commission at 10 o'clock.

The present rate of the company is $1.50 per 1,000 cu. ft. (gross), the net amount being $1.35. The minimum service rate is now 25 cents. In its petition the gas company asks for the right to raise the rates as follows: Gross rate, $2 per 1,000 cu. ft.; $1.80 the net rate for 1,000 cu. ft., and a minimum service charge of 50 cents.

Among other reasons, the gas company asks that this increase be given them for the reason that the price of materials and labor used in production has and is steadily advancing in price.

Stockholders' Meeting of Chicago Company to be Feb. 11

The next annual meeting of the stockholders of the Peoples Gas Light & Coke Company, of Chicago, will be held at 11 o'clock on the morning of Feb. 11, at the offices of the company, it is announced by President E. G. Cowdery. In accordance with the by-laws the transfer books were closed at the close of business on Jan. 19, 1918, and will be reopened on Feb. 12.

Societies and Associations

THE NATURAL GAS ASSOCIATION OF AMERICA will hold its 1918 convention in Pittsburgh, May 21 and 22, and not in Louisville, Ky., as planned. This change has been made necessary by the fact that the building in which the convention was to be held in Louisville has been commandeered by the Government as a sewing depot. It is further announced from association headquarters that the usual exhibit by the Supply Men's Association will be eliminated this year on account of war conditions. The following official notice has been sent out by Vice-President David O. Holbrook: "At a meeting of the board of directors of the Natural Gas Association of America, held in Pittsburgh, Dec. 1, a letter was read from C. C. Ousley, of the Louisville Convention and Publicity League, under date of Sept. 26, advising that there must be a change made in the plans for the convention, which was scheduled to meet in Louisville in May of 1918. The Government has commandeered the building in which the convention was to be held, and is to use it as a sewing depot for the period of the war. After a thorough discussion by the board of directors, it was decided that, on account of the necessity for economy, and the railroad congestion, it would be advisable to hold the next convention without the customary auxiliary convention of the Association of Natural Gas Supply Men, devoting the entire time of the meeting to the discussion of the problem of the natural gas industry. Each year the members of the Supply Men's Association spend approximately $75,000 in the expenses of their representatives and the installing of their exhibits. It

was thought by the directors of the Natural Gas Association of America that this expenditure was not justified under the present conditions, and a motion was passed recommending to the directors of the Association of Natural Gas Supply Men the elimination of the exhibit feature this year. The convention of the Natural Gas Association will be held as usual, although the session will be only two days instead of three. Because of the probabilities of securing a larger attendance at Pittsburgh than at any other point, it was decided to hold the convention there."

THE BROCKTON (MASS.) GAS LIGHT COMPANY EMPLOYEES' BENEFIT ASSOCIATION at its regular monthly meeting, held Monday evening, Jan. 21, in K. of C. Hall, presented a playlet entitled "Twentieth Century Salesmanship," which was written and directed by J. B. Anderson, assistant manager of the company. All those taking part in the program were members of the association. There were selections by the orchestra and a male quartette. George H. Priest gave an address on "Why America Entered the War." Reports from various committees were heard at a short business meeting, and it was voted to hold a ladies' night instead of the novelty dancing party which was recently called off on account of the coal shortage. The committee in charge will be J. B. Anderson, James P. Moran, Wilfred Jodoin and Mark Fitzmaurice.

Personal Notes

C. W. TAGGART was recently tendered a dinner by the Chamber of Commerce of Charles City. Mr. Taggart left for Philadelphia, where he assumed charge of a department of the American Gas Company.

JOHN R. WELCH, a banker of Indianapolis, has just been elected president of the Citizens Gas Company, of Indianapolis, which operates both its own property and that of the Indianapolis Gas Company by a ninety-nine-year lease. Mr. Welch, who was treasurer of the company up to the time he was elected president, takes the place of Franklin Vonnegut. G. A. Efroymson was elected treasurer of the company to succeed Mr. Welch.

J. J. GORMAN is now in charge of the new business department of the Citizens Gas & Electric Company, of Waterloo, Iowa.

AUSTIN BURT, formerly manager of the Citizens Gas & Electric Company, Waterloo, Iowa, has recently been made general manager of the company as well as of the Cedar Valley Electric Company.

M. C. CHRISTENSEN, who has been with the Citizens Gas & Electric Company, Waterloo, Iowa, for many years, was recently made chief clerk.

WILLIAM STOEHR, who has been active manager of the Boise (Idaho) Gas Light & Coke Company for a number of months, discontinued in that capacity the first of the month to give entire attention to his other affairs. He is succeeded by Charles Eyman, who was formerly manager of the company.

THE VINTON (IOWA) GAS COMPANY at its recent meeting elected the following officers: E. T. Bryant, president; B. M. Bills, vice-president; W. S. Goodhue, treasurer, and Martin Kennedy, manager. Mr. Kennedy succeeds Jay Countryman, who has been manager for the past seven years. Mr. Kennedy recently purchased the stock held by A. W. Hizer, Rochelle, Ill., former president of the company, and thereby becomes the principal stockholder in the company.

ELMER E. CLAY, who for the past several years has been the assistant manager of the Goshen (Ind.) Gas Company, resigned from this position Feb. 1.

G. S. BUTLER, who for five years has been superintendent of the St. Albans (Vt.) Gas Light Company, left Jan. 15 for Leominster, Mass., where he has taken a position as superintendent of the Leominster Gas Light Company.

THE PLATTSBURG (N. Y.) GAS & ELECTRIC COMPANY at the annual board of directors' meeting Jan. 15 re-elected the following directors: W. M. Levy, O. J. Nichols, G. M. Cole and H. E. Barnard.

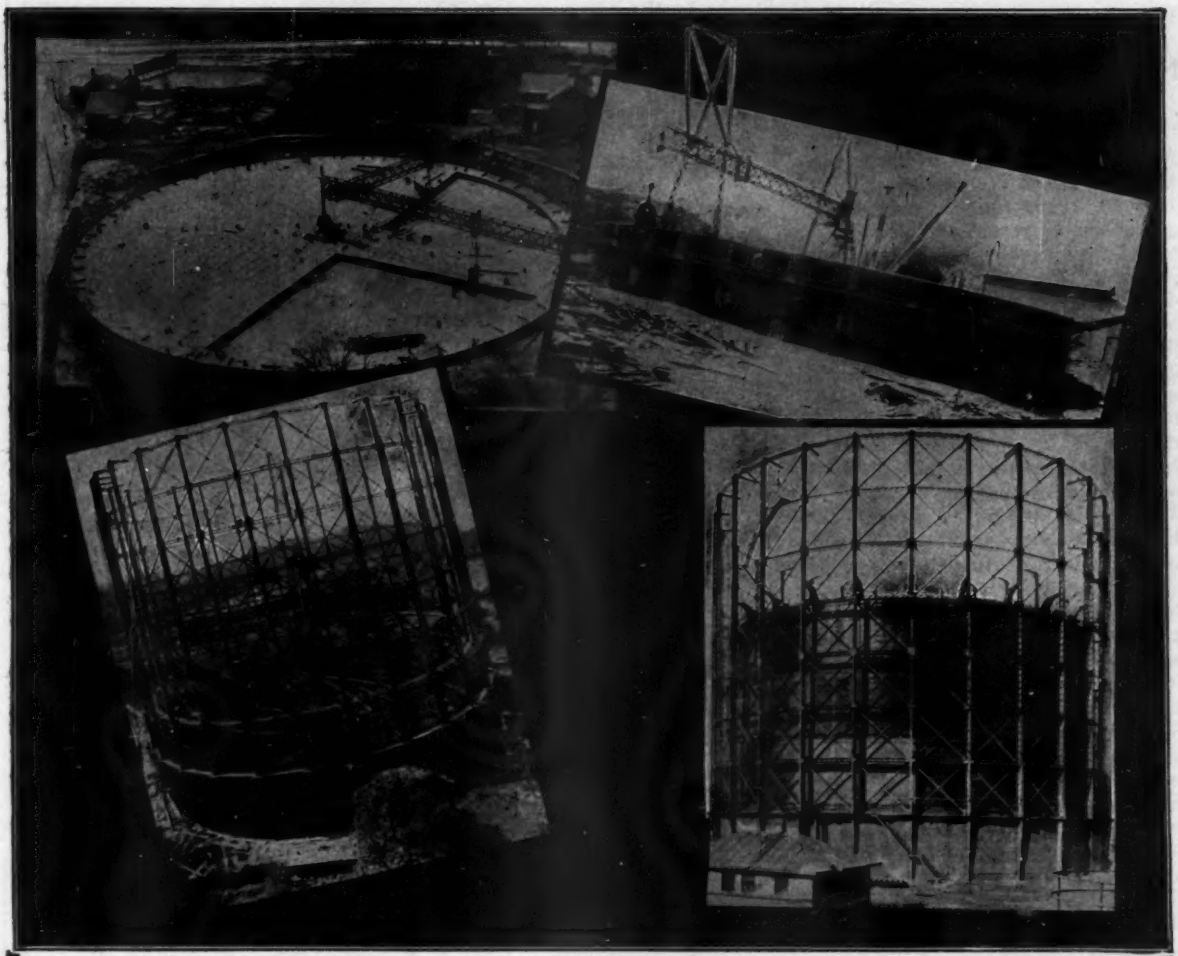
THE ALUM ROCK GAS COMPANY, of Oil City, Pa., held the annual meeting of its stockholders Jan. 15, at which the following directors were elected for the ensuing year: G. S. Hamm, H. R. Merritt, D. T. Borland, C. W. Prescott, Joseph Levi, N. F. Osmer, H. J. Slicker, F. von Tacky, W. W. Splane, W. S. McCuen and E. P. Theobald. Immediately following the stockholders' meeting, the board organized by electing G. S. Hamm, of Knox, Pa., as president; H. R. Merritt, of Oil City, vice-president, and Claude Slicker, of Oil City, as secretary and treasurer. H. J. Slicker, of Knox, Pa., was elected general manager and H. K. Dietterich, of Knox, field superintendent.

WILLIAM H. CURTIN, who has been at the head of the cost department of the American Seeding Machine Company for some years, has accepted the superintendency of the Superior Gas Engine Company's plant at Springfield, Ohio.

EDWARD DEVARNEY will take charge of the manufacturing end of the business of the St. Albans (Vt.) Gas Light Company, succeeding G. S. Butler.

THE GREENVILLE (MISS.) GAS COMPANY at its regular annual meeting held recently at the offices of the company the following officers were elected for the ensuing year: B. O. Tippy, president; Charles U. Gordon, vice-president; W. V. Delahunt, secretary and treasurer; E. H. Collins, manager, and Charles U. Gordon, financial agent. The board of directors is composed of B. O. Tippy, of Detroit; W. V. Delahunt, of St. Louis; E. H. Collins, of Greenville; C. Y. Boardman and Charles U. Gordon, of Chicago.

THE OHIO CITIES GAS COMPANY income statement for the six months ended Nov. 30, 1917, as filed with the New York Stock Exchange, follows: Gross earnings, $10,864,939; net after taxes, $4,786,303; balance after charges, $4,626,928; dividends, $2,599,048; surplus, $2,027,880; profit and loss surplus, $46,843,191. Allowing for six months' dividends on the preferred stock, the balance available for the $35,000,000 common stock ($25 par) was equal to $3.13 a share.



RITER-CONLEY COMPANY

STEEL CONSTRUCTION

PITTSBURGH

GAS PURIFYING MATERIALS

NATRONA RED ORE
To Be Mixed With Fluffing Material

MINERAL SPONGE
The Best Fluffing Material

MINERAL SPONGE OXIDE
Prepared For Use

PENNSYLVANIA SALT MFG. CO.
WIDENER BUILDING
PHILADELPHIA - - - - - - - PENNA.

New York Engineers to Promote War Activities

The New York Chapter of the American Association of Engineers was established Wednesday evening, Jan. 16, 1918, for the purpose of giving our Government full support to military problems in every way possible. The activity of national distribution of technical service will be greatly advanced with the establishment of this Eastern branch. The charter, which was granted by the national organization, was presented by President Edmund T. Perkins at the installation meeting, which was held at the McAlpin Hotel. The keynote of the meeting was sounded by Mr. Perkins in his address on "The Engineer's Relation to Society," who urged the men to broaden their social and civic activities, paying more attention to the human equation of engineers and to assume greater responsibility for the profession.

Alexander Potter, consulting engineer, of New York City, complimented the association on its national success with the problems relating to human and business sides of the engineering profession. A. H. Krom, general secretary of the American Association, gave a summary of the activities of the national organization, outlined the objects and urged the members to continue the work and co-operate with all technical societies as well as to teach all engineers that this is a business organization in a field of its own which conflicts with none. R. H. Vanderbrook was elected chairman of the New York Chapter, and purposes that his administration shall give full support in military matters during this national, industrial and technical crisis. The war has brought on a growing importance for engineers, and it is the intention of this national organization to maintain the high standard which is being gained. E. J. Mehren, editor of the *Engineering News-Record*, S. J. Stone, A. C. Davis and others presented valuable suggestions towards increasing the service to individual members. The New York office is at 220 West Forty-second Street, with J. L. Birner secretary.

The Ohio Cities Gas Company at its recent directors' meeting declared the regular quarterly dividend of 5 per cent on the common stock, payable March 1 to stockholders of record Feb. 15.

Construction Notes

Stock Issue Authorized for New Holder and Extensions at Cambridge City, Ind.

The Public Service Commission of Indiana has just issued an order authorizing the Cambridge City Natural Gas Company to issue $60,000, par value, of its 5 per cent preferred stock, in order to pay for the erection of a new gas holder, to purchase and lay gas mains, drill and equip new gas wells, to purchase real estate upon which to erect said gas holder, and for the purpose of making additions, extensions and betterments to gas plants.

Southern California Company Bids for Hermosa Plant

Joint application for authority to sell all properties of the Western Fuel & Gas Company to the Southern California Gas Company was filed recently with the State railroad commission by the two concerns affected.

The proposed consideration was given as $150,000. The Western concern owns a gas generating plant at Hermosa, and distributing systems in Hermosa, Redondo and Manhattan Beach, Los Angeles County.

Canvassing Hibbing District for Consumers for New Plant

The first step since the site of the Hibbing gas plant has been secured is now to ascertain the number of customers the system will have. Village employees under the direction of Village Recorder John P. Murphy will start a canvass of Hibbing, Alice and Brooklyn, Minn., to ascertain the houses that will be served by the plant from the start.

The construction of the plant which is to be built by the American Gas Construction Company, Newton, Iowa, was to have been started November, 1917, but the difficulty in securing a site has prevented the starting of the work.

Site South of Alice

The new site, which is located just south of Alice, is believed to be a still more suitable site than the one in Brooklyn, as the plant will be on the direct main from the village wells, 6 miles south of Hibbing. This site is also convenient to Alice, and the water and light station now located on North Street, when it is moved will be transferred to this site.

The village will still maintain the proceedings to obtain the 80 acres south of Brooklyn which is owned by the State. The State's appeal from the award of the condemnation jury is still in district court.

To Start at Hibbing

The canvassers will start the investigation in Hibbing, and after a census of the customers has been obtained in the village will go to Alice and Brooklyn. It is believed that the greater part of the village and suburbs will become gas customers from the start. The rate has not been fixed, but it is not believed that it will be high.

Some slight changes in the plans of the feed mains will be necessary through the change in site, but these changes will not delay the work. Part of the material for the plant has already been received and will be transferred to the new site immediately.

The plant will be erected under the direction of G. H. Cressler, Chicago, consulting engineer, and the work of construction will be started shortly.

Eau Claire Holder Nears Completion

The big gas tank under construction by the Stacey Manufacturing Company for the Wisconsin-Minnesota Light & Power Company will be completed within a few days, Foreman W. M. Zanone expects. The water tank measures 84 ft. in circumference, and is 29 ft. high. It holds 1,350,000 gal. of water, which was run in recently. When filled with gas this container will measure 84 ft. from top to bottom, 20 ft. under ground. The capacity of the tank will be 300,000 cu. ft. of gas, or about twice that of the old tank. One hundred fifty thousand tons of material is being used in the construction of the new tank, including 7½ tons of rivets.

ALONG your mains are many stores that would use gas for lighting *if they realized* that gas light has been made modern and appropriate.

Show them the Radio-Series. Explain the better quality of brilliance, the improved efficiency and economy you offer and they will buy.

This is *a war-time opportunity*—the kind of business that you need.

General Gas Light Company

New York Kalamazoo San Francisco

A Busy World Is Short of Labor

Storekeepers, manufacturers, business men everywhere are up against a shortage of labor. Grasping every idea for better, faster work, they are not overlooking LIGHT—the Dad of all efficiency —eye-resting gas light.

Safety with speed requires an even spread of illumination everywhere, and gas with the

"Reflex-20"

makes this possible because of the low cost of installing, the low cost of maintenance and gas, and the high power of the unit. Hence the Harvest for the Gas Company with the "Reflex-20." Materials enough on hand to make up some more lamps, but to be sure of present prices you should get your orders in today.

WELSBACH COMPANY

Factories: Gloucester NEW JERSEY

The "C-C" Lighter—"the pilot that won't blow out"—is making a hit on "Reflex-20" installations

Menominee, Wis., Gas Company Granted Increase Petition

Announcing its decision on the application of the Wisconsin Trust Company, receiver of the property and assets of the Menominee Gas Company, for authority to increase gas rates in the city of Menominee, the railroad commission has issued an order authorizing the Wisconsin Trust Company to discontinue the existing rates and substitute for them a new schedule. The new net rates, effective Jan. 1, 1918, are as follows, the sum stated being per thousand cubic feet per month:

First	1,000	$1.65
Next	2,000	1.55
Next	2,000	1.45
Next	5,000	1.35
Next	10,000	1.15
Over	20,000	1.10

Old Rate Schedule

The net rates hitherto in effect were:

First	5,000	$1.30
Next	3,000	1.20
Next	2,000	1.10
Over	10,000	1.00

Sold Gas at Loss

"At the present time the company receives approximately $1.30 per thousand cubic feet for all gas sold so that it can be readily seen from the above statement that under those costs, with no allowance made for depreciation, the company sold its gas at an approximate loss of 10 cents per thousand cubic feet. During this period the price of coal delivered at the plant was $4.75 per ton; coke was bought at $6.60 per ton, and the price paid for oil was $7.87 per hundred gallons."

At the time of the hearing the representative of the receiver stated that coal was costing the company $5.75 per ton and coke $11.

The commission says: "Taking into account the increase in the price of coke and coal, irrespective of an increase in labor or any supply items, we find that the above cost of $1.3927 per thousand cubic feet of gas sold is increased by about 13 cents, making a total cost of about $1.52. Assuming a yearly sale of 9,397,500 cu. ft., we estimate that the cost to the company will be about $14,284; this does not in any way include any provision for depreciation or a return upon the value of the property."

Disallows Minimum Charge

The commission holds the rates asked for as not excessive. The probable revenue for a year's operation at these proposed rates will be about $14,500. The only modification in the schedule asked for is the fixing of the price in excess of 20,000 cu. ft. a month at $1.10 net. The request for an increase in the minimum charge of from 50 cents to 85 cents per month is not allowed.

An order was issued fixing the net rate as stated at the beginning of this article.

To File Reconnection Charge

In order, however, to earn the rate stated the consumer must pay the charge on or before the 10th day of the month following the month of service rendered. If not so paid the charge will be 10 cents a month per cubic feet higher than the quoted rate, the highest in that case being $1.75 for the first thousand and the lowest $1.20 a thousand for over 10,000.

The company may file with the commission for adoption and approval a rule relating to reconnection of service. Rates as fixed in the order may be made effective for bills rendered on or after Jan. 1, 1918.

Massachusetts Light Sales Show Good Gain

The gas and electric light companies owned by the Massachusetts Lighting Companies report aggregate net sales of gas and electricity for December, 1917, $139,500.20, an increase of $9,700.20 over December, 1916.

For the six months ending Dec. 26, 1917, the net sales were $789,219.19, a gain over the same period last year of $80,627.22.

Sioux City Company Pays Its Tax on Gross Receipts

The franchise tax of the Sioux City Gas & Electric Company for the last half of the year 1917, was paid into the city treasurer's office recently. The tax amounted to $10,550.59, and shows a marked increase in the business of the company for the year. The total tax for the year is $21,195.36.

The tax collected by the city is 3 per cent of the gross receipts. The total gas receipts for the six months' period was $221,480.94. The 3 per cent tax due the city on this amount was $6,664.43.

Lecture to Woman's Club Part of Gas Company Merchandising Plan

Members of the New Haven Woman's Club were invited to a lecture and demonstration which was arranged by the New Haven Gas Light Company recently. The company had secured the services of Miss Dorothy S. Buckley, domestic science supervisor of Brooklyn, N. Y., who came from Brooklyn for the occasion. She has been most successful and energetic there and it is expected that the lecture was a very instructive one.

A complete dinner was cooked and distributed through the audience, members of the household economics department serving.

Supply at Waco, Tex., Curtailed

All consumers of gas in the city of Waco, Tex., who use more than 50,000 cu. ft. per month were cut off by order of the city commission to the Texas Power & Light Company. The action of the commission was taken unanimously at a special session called by Mayor Dollins recently.